Collaborative learning in pre-service teacher education: Primary school teachers' competence and educational practice

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VOORWOORD

De eekhoorn begon te denken, zo hevig als hij kon, aan beukennoten en
aan dennenappels en aan de rivier en de zon en de zomer.
Hij stootte de mier aan en zei: 'Daar moet je
ook aan denken, mier, aan de zomer!"

naar Toon Tellegen

Bij het lezen van de dierenverhalen van Toon Tellegen vereenzelvig ik mij vaak spontaan met de eekhoorn, maar bovenstaande quote dwingt mij eerder in de rol van de mier. De voorbije maanden was het winterkoud en donker: het ideale moment om dit proefschrift te finaliseren. Ik heb het geluk gehad vele eekhoorns rondom mij te kennen die me de zomer en het einde van dit doctoraat voor ogen hielden. Dit voorwoord wil ik dan ook graag aan hen wijden, om hen te bedanken voor de gedachten aan de rivier, dennenappels, beukennoten, aan de zon en de zomer!

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Ilse
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1 General introduction

Some parts of this chapter are based on:

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CHAPTER 1
General introduction

1. Introduction

During the last decades, the importance and value of instruction in accordance with social-constructivist notions is increasingly emphasised (Carlson, 1999; Levin, 2000), believing that it is no longer possible to prepare students from a knowledge-transmission perspective to a place in the contemporary changing, complex, uncertain, and diverse society (Darling-Hammond & Bransford, 2007; de Kock, Sleegers & Voeten, 2005; Hargreaves, 2003). Contrary to the previously dominant model of knowledge transmission, where instruction almost exclusively consisted of a one-way communication process from the teacher to the students (Hargreaves, 2003; Jonassen, Strobel, & Gottdenker, 2005), in the constructivist paradigm the activity of the learner and the possibility of building shared knowledge based on peer interaction are emphasised (Jonassen, 1999).

In line with the central place of peer interactions in the constructivist learning context, the amount of references to collaborative learning studies, predominantly in primary school settings, indicates that it is well situated in educational research (Alfonseca, Carro, Martín, Ortigosa & Paredes, 2006; Gillies, 2004; Goodman, Linton, Galmari, Hitzeman, Ross & Zarella, 2005; Lopata, Miller & Miller, 2003; Slavin, 1996; Slavin, 2004; Suthers & Hundhausen, 2003). Collaborative learning is manifest in different forms in educational practice, which we will discuss more in detail in the theoretical framework below. Although collaborative learning is often used in technology-based environments (e.g. De Wever, 2006; Suthers & Hundhausen, 2003), we focus in the present dissertation on face-to-face collaborative learning given its suitability for primary school children, who may not have mastered sufficient technology-related competences yet.

Many studies regarding the effectiveness of collaborative learning have revealed positive results regarding (meta)cognitive performance, social functioning, and psychological development of predominantly primary school children. First, Johnson and Johnson (1989) have found that cooperation tends to result in higher achievement, greater long-term retention of what is learned, more frequent critical thinking and metacognitive thought, more accurate and creative problem-solving, more willingness to take on difficult tasks and persist in working toward goals accomplishment, more intrinsic motivation, transfer of learning from one situation to another, and greater time on task. Other researchers (e.g. Fawcett & Garton, 2005; Lou et al., 1996; Slavin, 1996) confirmed these findings. Gillies (2006) has found that the quality of interactions between pupils accounts for significant differences in

the effects of peer collaboration on achievement. Further, research indicates that collaborative learning promotes the social functioning of children. During peer collaboration, interpersonal relationships are promoted and group members perceive greater social support from their group members (e.g. Johnson et al., 2001; Marzano et al., 2001; Tolmie et al., 2010). Third, the psychological development of children is positively influenced by the use of collaborative learning: not only the level of self-esteem is affected during peer collaboration, but also pupils' self-efficacy (e.g. Johnson & Johnson, 1999; Marzano et al., 2001).

Notwithstanding these promising results on the effectiveness of collaborative learning, some authors refer also to disadvantages or pitfalls in relation to learning in groups. For example, it was found that the use of collaborative methods may have negative effects on students' motivation when some group members do not participate actively (Jacques, 2004), or that it may increase the experience of cognitive load (Moreno, 2009). Further, Gillies (2006) and Webb (2009) indicated that group discussions may be superficial instead of in-depth. However, the literature focuses predominantly on the positive outcomes of collaborative learning and the conditions under which collaborative learning is effective in order to avoid potential negative effects.

Anyway, the large amount of evidence regarding the effectiveness of collaborative learning can be a stimulus for teachers to integrate collaborative learning in educational practice, in addition to the governmental expectations regarding the use of peer collaboration. In the Flemish context, there are several cross-curricular attainment targets related to social skills in peer relationships for primary school children (Ministry of the Flemish Community, 2010). Collaborative learning can be a valuable instructional strategy to aim purposefully at these targets. The Flemish professional profile for teachers refers also explicitly to the importance of teachers being able to use appropriate grouping strategies for children in their classrooms (Ministry of the Flemish Community, 2007).

However, notwithstanding the recommendations of scholars regarding the use of collaborative learning and governmental expectations in this respect, collaborative learning is yet only implemented to a small extent in educational practice (Baines, Blatchford, & Kutnick, 2003). Bringing this instructional strategy into practice has appeared to pass off with difficulty, like is often the case with educational innovations (Fullan, 2001). As a consequence, the role of teachers during collaborative learning and therefore also the impact of teacher education has gained increased attention during the last decade. Teacher education is held responsible for preparing teachers with the background of collaborative learning and the actual implementation of it in practice (Cohen et al., 2004; Grossman, 2005). This acknowledgment coincides with an increasing number of professional development initiatives and related research focused on collaborative learning. Most

of these studies, however, concern senior teachers that are trained to use collaborative learning as an innovation in their traditional instructional strategies' repertoire (e.g. Gillies, 2004; Ishler et al., 1998; Krol et al., 2008). Although these studies in in-service teacher education make a valuable contribution to contemporary practice, it remains important to familiarise and train also new generations of teachers in implementing collaborative learning in order to break the circle of traditional teaching (Lunenberg & Korthagen, 2005). Studies in the context of pre-service teacher education are limited and concentrated until now predominantly on the investigation of student teachers' beliefs towards and intentions to use collaborative learning (e.g. Veenman et al., 2002). The investigation of pre-service student teachers' competence and the development of these competences has been largely overlooked in the literature, although previous studies have demonstrated the importance of competency development to stimulate and sustain the use of collaborative learning (Abrami et al., 2004; Baines, Blatchford & Kutnick, 2003; Gillies et al., 2007; Veenman et al., 2002). Therefore, the present dissertation will emphasise the professional development in pre-service teacher education with regard to collaborative learning implementation. Given that the evidence of effect studies about collaborative learning was mainly situated at primary school level, we opt for pre-service teacher education for primary school teachers in Flanders.

This first dissertation chapter presents a general introduction to the following empirical studies and consists of two sections. In the first section, we present a theoretical framework on the central concepts and variables of this dissertation. The second section of this introduction chapter presents the content and organisation of the dissertation. It starts off with the research objectives and the concrete research questions. Furthermore, we provide an overall design of the empirical studies. Finally, we include an overview of the dissertation structure, presenting each chapter shortly.

2. Theoretical framework

In this theoretical framework, the concept of collaborative learning is first discussed in detail. Further, we go more deeply into the challenging role of teacher education in familiarising teachers with the implementation of this instructional strategy in their practice. We focus on important phases, concepts and variables in this process of professionalisation regarding the implementation of collaborative learning.

2.1 Collaborative learning

A clear conceptualisation of 'collaborative learning' is vital in the context of this dissertation. In the literature on group learning strategies, the concept of 'collaborative learning' is, however, often used interchangeably with 'cooperative learning' (MacInnerney & Roberts, 2004). Resta and Laferrière argue*: 'There is no universally adopted meaning of the terms 'collaborative' and 'cooperative' learning or agreement on precisely what their differences or communalities are.'* (2007, p.66). The literature on both concepts is extensive and authors take up a different position within the discussion about the relationship between collaborative and cooperative learning.

Cooperative learning was developed in the sixties as a structured form of group work where students pursue common goals while being assessed individually (Millis & Cottell, 1998). The 'Learning Together' model of Johnson and Johnson is the most well-known model of cooperative learning (Johnson & Johnson, 1999). Other important cooperative learning models are for example the 'Structural Approach' of Kagan (1994), Sharan's 'Group Investigation' (1994), or the 'Student Team Learning method' of Slavin (1996). All cooperative models share a focus on cooperative incentives rather than competition to promote learning.

Collaborative learning refers to any instructional method in which students work together toward a common goal, emphasising interaction and group processes (Prichard, Bizo, & Stratford, 2006). Collaborative learning strategies are less specific and not easy to define, since they include a broad scope of strategies that are not necessarily systematic or prescriptive (Rose, 2002). Particular forms of interaction between team members, such as asking questions, debating, and explaining, encourage active and purposeful knowledge construction and ensure that everyone in the group benefits from working together (Dillenbourg, 1999; Slavin et al., 1985).

Both approaches share a sense of community and share the belief that learning is an active, constructive process (Millis & Cottell, 1998). They share at least the purpose of students' working together in small groups toward a common goal to maximise their own and each other's learning (Johnson & Johnson, 1999). Other authors tend to emphasise differences between collaborative and cooperative learning, such as having distinct historical and philosophical traditions (e.g. Bruffee, 1995; Panitz, 1997), or having a different nature of the task structure (e.g. Curtis & Lawson, 2001) and level of pre-structuring (e.g. Strijbos & Martens, 2001).

In the present dissertation, we endorse to the view that 'collaborative learning' (CL) can be seen as covering all peer collaboration methods, amongst which for example peer tutoring and cooperative learning (De Wever, 2006; Dillenbourg, 1999; Meloth & Deering, 1999; Millis & Cotell, 1998; Palinscar, 2002; Rose, 2002).

In this view, *'cooperative learning can be regarded as a more-structured, hence more-focused, form of collaborative learning'* (Millis & Cottell, 1998, p.4; see also Flynn & Klein, 2001).

From the research tradition on cooperative learning, basic elements of effective group learning strategies are defined, which are also often emphasised in studies on CL (Dillenbourg, 1999). In our present dissertation, we interpret these basic elements as necessary conditions within the broad range of potential CL strategies.

Johnson and Johnson (1989) build on their social interdependence theory to state that the positive results of CL for pupils are largely dependent on the presence of a certain set of conditions, that are mostly called 'key components of CL'. These conditions are positive interdependence, individual accountability, promotive interaction, social skills, and group processes. When teachers understand how to implement these components, they can structure CL in any lesson in any subject area with any set of curriculum materials, and adapt CL to the specific circumstances or needs (Johnson, Johnson, & Smith, 2007). Gillies (2006), Hornby (2009), and Veenman et al. (2002) confirmed the importance of these conditions for the effective use of CL. We discuss each of these elements more in detail.

Positive interdependence relates to the core concept of the social interdependence theory. There are two types of social interdependence: positive (cooperation) and negative (competition). *'Positive interdependence exist when individuals perceive that they can reach their goals if and only if the other individuals with who they are cooperatively linked also reach their goals and, therefore, promote each other's efforts to achieve the goals.'* (Johnson, Johnson, & Smith, 2007, p. 16). Negative interdependence refers to a situation where individuals are competitively linked to each other. In this respect, they can only obtain their goals when others fail to obtain their goals. It is therefore in a competitive situation more attractive to obstruct each other's effort to achieve the goals. In a situation of no interdependence, individuals perceive that they can reach their goal regardless of whether the other members of the group attain or do not attain their goals. For the effectiveness of CL, positive interdependence is crucial since it motivates students to work together when they know they are linked with group members in a way that one cannot succeed unless the others of the group succeed. Group members are stimulated to share their resources, provide mutual support, and to celebrate their joint successes. There are three categories of interdependence: outcome, means, and boundary interdependence (Johnson & Johnson, 2009). Without outcome interdependence, there is no cooperation, nor competition. Means interdependence refers to resource (each group member has part of the resources needed to complete the task), role (members are assigned complementary roles), and task (division of labour) interdependence. They are overlapping and not independent from each other.

Finally, the boundaries define who is interdependent with whom. It includes outside enemy (e.g. negative interdependence with another group), identity (which binds group members together as an entity), and environmental interdependence (seated together).

The second key component is individual accountability, which ensures that each group member has responsibilities for his own learning as well as for helping the other members of the group learn. Children need to know that they cannot exploit the work of others. Individual accountability may be structured for example by giving an individual test to each student, or by observing and documenting the particular contribution of each group member.

Third, promotive interaction exists when individuals encourage and facilitate each other's efforts to complete tasks and achieve group goals. To obtain meaningful interaction, group size needs to be small (Leikin, 2004), making it possible for group members to exchange information, challenge each other's conclusions and reasoning, advocate working harder, provide feedback, et cetera. The use of roles can also promote interaction (Rose, 2004).

The fourth essential condition is the attention for social skills. CL aims not only at cognitive performance, but also social skills is explicitly part of the learning process and outcome. The success of CL requires interpersonal and small group skills of children, for example decision-making or conflict-management skills. These skills need to be taught just as academic skills (Johnson, 2006; Johnson & Johnson, 1999).

Fifth, group processes are emphasised to obtain collaborative goals. The effectiveness of peer collaboration is largely influenced by whether or not groups periodically reflect on how well they are functioning and how they may improve their learning processes. Therefore, teachers need to provide class time to ask group members to describe what actions were (un)helpful in achieving the group goals and maintaining effective working relationships. Based on the answers, decisions can be made about what behaviours to continue or change in view of continuous improvement of processes.

2.2 The challenge of collaborative learning for teacher education

In the first part of this chapter was already stated that the implementation of CL has not yet found a profound place in teaching practice (Baines et al., 2003), despite the acknowledged value of CL in the constructivist paradigm and the positive research evidence regarding the effectiveness of this instructional strategy. In this respect, a challenging role is reserved for teacher education to stimulate and prepare teachers

to the implementation of CL in their teaching practice (Cohen, Brody, & Sapon-Shevin, 2004; Hornby, 2009; Ishler et al., 1998; Veenman et al., 2002).

Based on previous research, the challenging character of familiarising student teachers with the implementation of can be looked at from different perspectives. We successively discuss the influence of anticipatory socialisation processes, the impact of teacher education on student teachers' competency development regarding CL implementation, and the crucial phase of entering into the teaching profession after graduation.

Anticipatory socialisation

Socialisation processes prior to teacher education may foster or hinder the preparation of student teachers for the use of CL in their future classrooms. Student teachers enter teacher education with numerous observational experiences about teaching and learning in compulsory education. As a result of these experiences, students already developed beliefs and conceptions about what 'education' is or has to be (Geddis & Wood, 1998). In general, teachers' educational beliefs can be understood as a set of representations guiding their concept of learning and instruction and their role in that process. Conceptions, on the other hand, are focused on specific topics in the instructional process (Hermans, van Braak, & Van Keer, 2008). The accumulation of beliefs and conceptions creates a robust interpretative frame of reference for teachers.

The implicit impact of observational socialisation experiences on the development of educational beliefs and conceptions is often problematised in the context of educational change. Researchers frequently refer to the problem of 'familiarity' (Geddis & Wood, 1997) or the 'apprenticeship of observation' (Lortie, 1975; Hammerness, 2005) to explain the difficult implementation and integration of innovations in contemporary education (Fullan, 2001).

> '*They [student teachers] have observed teaching for a considerable period of time and have formulated views about what teaching is like and how it is done. It is therefore not difficult to see how their understanding of teaching may well be caught up in a search for the familiar routines and strategies that they have experienced as students and how, at one level, their understanding of learning to teach involves simply learning those routines and strategies and applying them in practice*' (Loughran, 2006, p. 105).

When student teachers experienced only little attention for peer collaboration while being a student, teaching conceptions without a central place for peer collaboration are adopted through observation. Given that teachers are found to be more likely to implement instructional strategies fitting in with their teaching beliefs (Eley, 2006), the implementation of CL may be hampered as a consequence of the 'apprenticeship of observation'.

Anticipatory socialisation processes may influence three different types of beliefs and conceptions related to the implementation of CL. We distinguish between general educational beliefs, conceptions towards CL, and personal mental models of learning.

First, general educational beliefs are already developed through observational learning in compulsory education and relate to teachers' responsiveness to particular instructional strategies. In teacher thinking research, different conceptual labels and categorisations of general educational beliefs are found. However, two-dimensional systems distinguishing between teacher-centred and student-centred beliefs are paramount (e.g. Eley, 2006; Hermans, van Braak, & Van Keer, 2008; Lunenberg & Volman, 1999). In teacher-centred beliefs, the teacher is believed to determine what and how students will learn, whereas in student-centred beliefs students have considerable control over what and how they learn (Kember & Kwan, 2002). In the context of CL implementation, we believe that student-centred beliefs are more favourable for peer collaboration approaches.

Second, in compulsory education student teachers already developed specific conceptions towards CL, which may influence their readiness to use this instructional strategy in their future primary school classes. Veenman et al. (2002) found that the more positive student teachers' conceptions towards CL are, the more likely these student teachers will implement it. Abrami et al. (2004) found that more than 40% of the variance of senior teachers' use of CL can be explained by their expectations of success, value, and costs associated with the implementation. In previous research, most teachers are found to perceive CL as a worthwhile strategy (Bouas, 1996; Gillies & Boyle, 2010; Ledford & Warren, 1997; Nattiv, Winitzky, & Drickey, 1991; Veenman et al., 2002), although they also often stress the perceived cost (Gillies & Boyle, 2010; Veenman et al., 2002). The costs teachers refer to vary from practical constraints like the availability of materials (Abrami et al., 2004), the challenging and time-consuming character of (a) developing effective group tasks (Baines et al., 2003; Blatchford et al., 2003; Gillies, 2006), (b) re-organising the classroom (Gillies, 2006; Hertz-Lazarowitz, 2008), and (c) preparing pupils for collaborative work (Blatchford et al., 2003; Gillies & Boyle, 2010; Webb et al., 2006). Teachers also fear loss of control, loss of content coverage, and unequal contributions of pupils (Veenman et al., 2002).

The third orientation focuses on the beliefs that student teachers developed about their own learning processes. Vermunt and Van Rijswijk (1997) distinguish between different mental models of learning that can be defined as *'a coherent system of views on learning and teaching processes, which is decisive for what an individual means by learning, what learning activities he or she considers possible and desirable, which tasks in the teaching-learning process he or she considers his or hers and which tasks are destined for others'* (Lunenberg & Volman, 1999, p. 435). Based on Donche et al. (2003), we hypothesise that pre-service teachers who attach less importance to CL for their own learning process are expected to find CL also less valuable for their pupils. To date, however, we do not have research evidence to corroborate or falsify this hypothesis.

Beliefs and conceptions about teaching and learning that were developed through observational socialisation experiences in compulsory education, are further developed and sharpened in teacher education as a consequence of continued experiences in and with educational theory and practice. Zeichner and Gore (1990) speak about *'cumulative effects of the anticipatory socialisation'* (p. 333) in this respect.

In view of the development of beliefs and conceptions favouring the use of CL, and to counter negative conceptions that were developed through the apprenticeship of observation, teacher education is continuously challenged. Given that previous studies showed that the integration of CL in pre-service teacher education has a positive influence on student teachers' intentions to implement CL in their own classrooms (Hillkirk, 1991; Nattiv, Winitzky, & Drickey, 1991; Veenman et al., 2002), it may be important to guarantee positive experiences with CL in teacher education (Abrami et al., 2004; Bouas, 1996; Ledford & Warren, 1997; Nattiv, Winitzky, & Drickey, 1991). Although Ashton & Gregoire-Gill (2003) stressed that beliefs and conceptions are rather stable teacher characteristics and therefore difficult to modify, change in student teachers' beliefs is possible to some degree (Tanase & Wang, 2010). Further research is, however, needed to discover whether these changes can be sustained over time (e.g. when entering the teaching profession) and how these changed beliefs affect student teachers' teaching practice.

Competency development regarding CL implementation

Teacher education programmes are accountable for preparing student teachers adequately for the teaching profession. Given that the Flemish professional profile for teachers refers explicitly to the importance of teachers being able to use appropriate grouping strategies for children (Ministry of the Flemish Community, 2007), teacher education needs to familiarise student teachers with different

instructional strategies and grouping approaches, among which also CL. In addition to the promotion of positive conceptions towards CL through positive experiences with CL (as discussed above), the central focus of teacher education programmes is on competency development.

The restricted implementation of CL in teaching practice (Baines et al., 2003) was previously primarily attributed, often by teachers themselves, to a potential lack of competences and understanding about this instructional strategy (Abrami et al., 2004; Baines et al., 2003; Gillies, 2006; Gillies & Boyle, 2010; Meloth & Deering, 1999; Slavin, 1999; Veenman et al., 2000; Woolfolk Hoy & Tschannen-Moran, 1999). Teachers were generally found to attribute their level of competence to the intensity and quality of their professional preparation regarding CL, which they consider to be rather limited (Bouas, 1996). This finding resulted in an increasing number of professional development initiatives organised to improve teaching competences regarding CL (Cohen et al., 2004). These initiatives are predominantly carried out in the context of in-service teacher education and report mainly positive effects on senior teachers' intentions to use of CL in their practice (e.g. Abrami et al., 2004; Baines, Blatchford & Kutnick, 2003; Ishler et al., 1998; Krol-Pot, 2005; Lopata et al., 2003). Veenman et al. (2002) set up a course on cooperative learning in the context of pre-service teacher education, and found a positive impact on student teachers' intentions to use CL as well. Unfortunately, no extensive information about (student) teachers' actual competence in the use of CL and the impact of the training inititatives in this respect is however available until now.

In the present dissertation, we define competences as the combination of knowledge, skills, and attitudes, in line with Korthagen (2004). Being competent in the implementation of CL requires student teachers to have mastered crucial knowledge about CL, necessary skills to use this instructional strategy, and to have developed favourable attitudes towards CL implementation. We will discuss the available evidence in more detail for each aspect of this tri-partite concept of competence. In addition, we will consider pre-service teachers' self-perceptions of their competence (i.e. self-efficacy) given Bandura's claim (1986) of the link between self-efficacy and performance.

Knowledge. In the literature, knowledge is often conceptualised as representations of information stored in memory (Southerland et al., 2001). Murphy and Mason (2006) use the term knowledge *'to refer to all that is accepted as truth that can be externally verified and can be confirmed by others on repeated interactions with the object'* (p. 306). In general, the importance of a sound theoretical background for teachers is widely acknowledged in view of successful and effective teaching and learning (Verloop, Van Driel, & Meijer, 2001). Carpenter, Fennema, and Franke

(1996) state that *'the analysis of teachers' knowledge has become a central concern for understanding the process of teaching, for evaluating the teacher competence and for bringing about fundamental change in how teachers teach'* (p.3).

According to Shulman (1987), teaching effectiveness requires both subject matter (content) knowledge and pedagogical knowledge. Therefore, he introduced the concept of pedagogical content knowledge (PCK), suggesting that a teacher should be able to *'transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students'* (Shulman, 1987, p.15). In later studies, the pedagogical knowledge base is presumed to form the basis of teaching skills. More emphasis is therefore put on teachers' knowledge about pedagogical strategies apart from specific lesson content, allowing and stimulating more active engagement of the learner in the learning process, individually as well as cooperatively (Bereiter, 2002; Hargreaves, 2003; Major & Palmer, 2006).

Teachers' pedagogical knowledge about CL concerns what they have to know about this instructional strategy in order to be able to implement it successfully into practice. Lunenberg and Korthagen (2005) argue, however, that many teachers enter educational practice without a sound conceptual understanding of 'new' instructional strategies. As teachers play a central role in guiding CL, it is essential that they acquire a good grasp of its theoretical and empirical background and receive training in its practical implementation (Cohen, Brody, & Sapon-Shevin, 2004; Gillies & Boyle, 2008; Hornby, 2009; Ishler et al., 1998; Veenman et al., 2002). Teachers' actual pedagogical knowledge about CL is to date only investigated to a small extent.

Bouas (1996) initiated the research in this respect by measuring pre-service teachers' knowledge about the benefits associated with cooperative learning. The results were quite positive. However, Bouas (1996) focused only on student teachers' knowledge about the benefits of CL, although the pedagogical knowledge base regarding CL implementation is much broader. Further, the test that was used in this study included only true-false questions. Therefore, further research is needed using more in-depth assessment methods.

Further, Hornby (2009) recently assessed student teachers' factual knowledge about cooperative learning, revealing that they only have a limited pedagogical knowledge base about this instructional strategy. This study examined the pedagogical knowledge of student teachers with regard to cooperative learning, however, from the 'old' paradigm of investigating teacher knowledge, focussing largely on retrieving factual information. We therefore state that retrieving factual information is only a narrow interpretation of teachers' pedagogical knowledge since research and theory in cognitive science have shown that there may be several

types of knowledge (e.g. conceptual, procedural, or metacognitive knowledge; Anderson & Krathwohl, 2001; Krathwohl, 2002).

Given the limitations of the studies of Bouas (1996) and Hornby (2009), further explorations of student teachers' pedagogical knowledge pertaining to CL are still needed from a wider and more detailed perspective. First, no studies have yet focused on the investigation of (student) teachers' pedagogical knowledge base about the more general concept of 'collaborative learning'. Further, several types of knowledge need to be taken into account using adequate assessment methods. Based on the revised version of Bloom's taxonomy suggests, four major categories of knowledge need to be taken into account: factual, conceptual, procedural, and metacognitive knowledge (Anderson & Krathwohl, 2001; Krathwohl, 2002). In addition to these four categories of knowledge, six cognitive processes (remember, understand, apply, analyse, evaluate and create) may to be taken into account in the assessment of teachers' pedagogical knowledge (Anderson et al., 2001).

Skills. Based on studies regarding the effectiveness of CL for students, important teacher skills can be deduced. Teachers should have insight in how to structure the key components of CL in order to avoid free-rider effects, conflicts in the group, etc. (e.g. Gillies & Boyle, 2010; Gillies et al., 2008; Jacques, 2004; Meloth & Deering, 1999; Webb, 2009). In addition to the key components, teachers should expressly pay attention to their guiding behaviour and interventions during the collaborative process as well. More particularly, a teacher needs to know whether, when, and how to intervene. Several authors emphasise the monitoring, intervening, assisting, and praising behaviour of teachers during CL (e.g. Gillies et al., 2008; Jacques, 2004; Meloth & Deering, 1999). A rising wave of studies is particularly interested in the role of the teacher in fostering the quality of pupils' discussions and helping behaviour during group activities (Dolmans et al., 2003; Gillies & Boyle, 2010; Schmitz & Winskel, 2008; Webb, 2009).

Until now, however, only limited information is available about the extent to which teachers succeed in realising all the abovementioned conditions and instructional behaviour. Only two studies report on teachers' skills to implement CL. More specifically, Krol et al. (2008) report on the impact of a training programme on senior teachers' instructional behaviour during cooperative learning implementation, whereas Veenman et al. (2002) focused on pre-service teachers' instructional behaviour. The findings illustrate the effectiveness of the training programmes, but the actual skills of teachers are not discussed in more detail. For example, Veenman et al. (2002) reported significant differences between pre- and post-test observational data of student teachers' implementation of the CL key components, but no other aspects of teaching behaviour (e.g. organisational issues) were taken into account. In addition, the lack of descriptive data about student

teachers' performance creates difficulties to conclude about their actual CL implementation skills.

Given that a large number of authors refer to teachers lacking competence to implement CL (e.g. Abrami et al., 2004; Baines et al., 2003; Gillies, 2006; Gillies & Boyle, 2010; Meloth & Deering, 1999; Slavin, 1999; Veenman et al., 2000; Woolfolk Hoy & Tschannen-Moran, 1999), further research on teachers' actual skills during CL implementation is needed. In this respect, the research instrument (observational checklist) developed in the context of the study of Krol et al. (2008) is useful, although it needs further adaptations. For example, since most variables were measured by only one item, a more solid measurement approach is needed. Next to the development of adequate research instruments to investigate teachers skills' pertaining to CL implementation, it may be interesting to (1) focus more on pre-service student teachers as a research group, (2) study skills not only at a specific moment, but also as a process of competency development in view of the impact of professionalisation, and (3) to take into account teachers' skills in preparing lessons with CL given that previous studies stressed the relationship between the instructional planning phase and the extent to which teachers succeed in CL implementation (Baylor, 2002; Blumenfeld et al., 1996; Gillies & Boyle, 2010; Kitsantas & Baylor, 2001; Yildirim, 2003). The analysis of lesson plans would also meet Nijveldt's (2007) and Stronge and Tucker's (2003) plea for of combining different sources of assessment in order to acquire a comprehensive and accurate view of teaching competence.

Attitudes. Attitudes can be described as behavioural predispositions that lead to approach and avoidance behaviour (Krosnick, Judd, & Wittenbrink, 2005). With regard to CL implementation, attitudes may express a preference for or aversion to using peer collaboration strategies.

In general, a strong conceptual overlap can be found between the concepts of beliefs and attitudes. In some conceptualisations, beliefs are seen as part the cognitive component of a tri-partite concept of attitudes (Wyer & Albarricín, 2005). Attitudes are in these conceptualisations perceived to consist further of an affective and a conative component. In other definitions, attitudes refer to an affective factor influencing a person's actions, whereas beliefs refer to a cognitive influential factor. In these conceptualisations, beliefs are indicated as influencing but not strictly determining attitudes (Wyer & Albarricín, 2005). According to Ajzen (2005, p. 29), attitudes *'follow reasonably from the beliefs people hold about the object of the attitude, just as intentions and actions follow reasonably from attitudes.'*

Since many studies on CL have interpreted teachers' attitudes towards CL and its implementation in practice as a synonym for perceptions, beliefs, conceptions, et cetera on this topic (e.g. Abrami et al., 2004; Bouas, 1996; Ishler et al., 1998), we

refer to our elaborations on beliefs and conceptions in the context of anticipatory socialisation in this general introduction. In general, teachers are found to have positive beliefs/a positive attitude towards CL (e.g. Abrami et al., 2004; Veenman et al., 2002). Given that the attitudes/beliefs of both student and senior teachers towards CL are already studied to a great extent, this component of the concept of teachers' competence regarding CL implementation does not immediately urge for further research. Therefore, we will focus on knowledge and skills in the present dissertation when investigating student teachers' competences pertaining to CL implementation.

Self-efficacy. Closely connected to teachers' actual competences, feelings of self-efficacy have a strong influence on instructional behaviour. Plenty of evidence has been found over the past decades regarding the relationship of teachers' beliefs about their capabilities (i.e. self-efficacy) on their pedagogical behaviour and final teaching effectiveness (Knoblauch & Woolfolk Hoy, 2008; Tschannen-Moran & Woolfolk Hoy, 2007). However, Tschannen-Moran and Woolfolk Hoy (2007) stress that self-efficacy is *'a motivational construct based on self-perception of competence rather than actual level of competence. A teacher's self-perceived level of competence may be either higher or lower than an external assessment of teaching skill'* (p.946). Teacher may overestimate or underestimate their actual competences. These estimations may have consequences for the effort teachers invest in preparation and instruction, as well as to their persistence and resilience in the face of set-backs (Tschannen-Moran & Woolfolk Hoy, 2007; Woolfolk Hoy & Spero, 2005).

In general, significant increases in efficacy are found during student teaching, but during the first year of teaching self-efficacy significantly declines (Woolfolk Hoy & Spero, 2005). This may be due to the fact that novice teachers are often found to encounter a 'reality shock' (Korthagen et al., 2006; see below) when entering into the profession. As a consequence, they may recalibrate their meaning of good teaching and altering their standards (Tschannen-Moray & Woolfolk Hoy, 2007). Mastery experiences as well as contextual factors (e.g. teaching resources and interpersonal support) are largely influencing self-efficacy beliefs of novice teachers (Tschannen-Moran & Woolfolk Hoy, 2007; Woolfolk Hoy & Spero, 2005). As to student teachers, mastery experiences are also found to be an influential source of self-efficacy. In this respect, field experiences in a teacher education programme are crucial (Gurvitch & Metzler, 2009).

Research on teachers' self-efficacy regarding CL implementation in particular has yielded not very promising results. Senior teachers generally report feeling insufficiently prepared (Abrami et al., 2004; Gaith & Yaghi, 1997; Shachar & Shmuelevitz, 1997). Student teachers as well report only to have a moderate degree

of confidence with regard to their competences to use CL activities in their future classrooms (Bouas, 1996; Veenman et al., 2002). Low or negative feelings of self-efficacy are often believed to result in a lack of courage to put this instructional strategy into practice (Baines et al., 2003), whereas Tschannen-Moran and Woolfolk Hoy (2001) revealed that student teachers with higher feelings of self-efficacy are more resilient and persistent in putting effort in their professional development process. Future research on the impact of self-efficacy beliefs on the implementation of CL is, however, still recommended.

Entering into the teaching profession

A last important challenge with regard to the preparation of student teachers for the implementation of CL is related to the entrance into the teaching profession. As a consequence of a strong emphasis on academic knowledge in traditional teacher education, the literature often refers to the manifest gap between theory and practice (Loughran & Berry, 2005). This gap may have negative implications in the transitional stage between teacher education and the actual teaching profession. It appears to be difficult to maintain training effects since students may experience a 'reality/transition shock' when they enter into the profession (Korthagen et al., 2006). The harsh and complex realities of daily teaching may produce baleful washing-out effects. As to CL implementation, the shock of entering into the profession may result in traditional pedagogical behaviour without much attention for CL strategies, notwithstanding efforts of pre-service teacher education in familiarising student teachers in this respect.

However, research in pre-service teacher education has failed to date to study the impact of training in teacher education from a long-term perspective to gain insight into the actual and sustained use of CL by beginning teachers. The impact and effectiveness of professional development is to date predominantly carried out in and limited to the context of in-service training programmes.

The findings illustrate for example a positive training impact on senior teachers' intentions to use CL (e.g. Ishler et al., 1998; Lopata et al., 2003), the quality of their instructional behaviour during CL (e.g. Krol et al., 2008), their conceptions towards CL (e.g. Abrami et al., 2004), their sense of efficacy (e.g. Shachar & Shmuelevitz, 1997), et cetera. Training teachers in enriching the problem-solving interactions between pupils (Gillies, 2004), as well as training pupils in communication and helping behaviour (Gillies & Ashman, 1996; Oortwijn et al., 2008; Prichard et al., 2006; Terwel et al., 2001) also yields positive results.

Training programmes on CL for student teachers in pre-service teacher education have been found to stimulate student teachers' intentions to use CL in

their classrooms (Hillkirk, 1991; Nattiv, Winitzky, & Drickey, 1991; Veenman et al., 2002). Further, it was demonstrated that pre-service training in CL positively influences student teachers' conceptions towards CL (Bouas, 1996; Veenman et al., 2002), their knowledge about this instructional strategy (Bouas, 1996), and their self-reported instructional behaviour (Veenman et al., 2002).

It is however striking that these studies have failed to date to investigate the long-term impact of training regarding CL on daily teaching practice. In this respect, teachers' intentions to use CL are studied rather than investigating actual teacher behaviour. As a consequence, it remains unclear what motivates student teachers to (not) use CL in their initial exployment experiences, and how the experience it under different contextual conditions. Future research on the impact of professional development initiatives in teacher education on actual CL implementation is therefore still needed.

2.3 Conclusion

Three notable points of interest for further research have become apparent from the theoretical framework that was described above.

Focus on pre-service teacher education. The importance of making new generations of teachers familiar with an educational innovation such as CL (Lunenberg & Korthagen, 2005) supports the need for research on the topic of CL in the context of pre-service education (Grossman, 2005). Given the predominant focus on in-service training, there is a lack of data on the actual integration of CL in teacher education with the focus on first as well as second order education (Murray & Male, 2005). Teacher educators can use CL as an instructional strategy in their own lessons (second order education), and in the content of their lessons they can instruct student teachers on how to apply CL in their future classroom practice (first order education). Until now, the limited number of studies about CL in pre-service teacher education have failed to provide insight into the use of CL in both first and second order education, both from the perspective of student teachers as from the experience of teacher educators.

Focus on competences. The research on CL is abundant, although most studies concern the effectiveness of this instructional strategy for pupils' learning processes. Studies regarding the role of the teacher in CL implementation have focused mostly on beliefs, self-efficacy, and intentions to use this instructional strategy. This far, little is known about the actual skills and knowledge of new generations of teachers. Even in existing studies that concern the impact of explicit training programmes for CL use in pre-service teacher education, the development of competences is largely neglected or discussed only superficially (Bouas, 1996; Veenman et al., 2002).

Future research should also take into account the plea of Nijveldt (2007) to use different sources and perspectives while collecting data, e.g. lesson plans as a source of information on student teachers' competence regarding CL implementation.

Need for a long-term perspective on CL implementation. Studies including a training intervention about CL for pre-service student teachers failed this far to study the impact on CL implementation in the long run. In this respect, intentions regarding the use of CL are inadequate to assess the impact of training on the integration of CL in teaching practice. The actual use of this instructional strategy needs to be observed. In view of the sustained use of CL, it is also important to investigate how teachers are motivated to use CL after they left the training context, in line with comparable studies that focused on senior teachers' experiences (Gillies & Boyle, 2010; Ishler et al., 1998).

3. Research objectives

The general aim of this dissertation is to gain insight into the integration of CL in pre-service teacher education in Flanders (Belgium) on the one hand, and to study and further develop student teachers competences with regard to CL implementation on the other.

Based on the conclusion of the theoretical framework, five research objectives (RO) are studied in the present dissertation in order to address the general research aim.

RO 1: *Exploring the current implementation of CL in pre-service teacher education in Flanders.*

Given the lack of information about the current integration of CL in pre-service teacher education, it is necessary to perform a state-of-the-art study, both from the perspective of student teachers as of teacher educators since the latter's point of view was not yet investigated in former research. The findings of this explorative study can be a starting point for designing or adapting the professionalisation of pre-service student teacher regarding the use of CL in pre-service teacher education.

RO 2: Developing instruments to measure student teachers' competences regarding the use of CL.

Analysing student teachers' competences regarding the use of CL in an appropriate way requires the development and validation of adequate measurement instruments. The theoretical framework clearly indicated that the existing

instruments of Bouas (1996) and Hornby (2009) for measuring student teachers' knowledge about CL were too fragmented. The observation checklist of Krol et al. (2008) for measuring senior teachers' skills during CL implementation appears to be a useful starting point that however still needs further elaboration. When we want to meet the plea of including additional sources of evidence of competence (Nijveldt, 2007), preferably lesson plans given the importance of instructional planning for successful teaching performance (Baylor, 2002), adequate analysis instruments will also have to be developed.

Summarising, we aim to develop an instrument for measuring (a) the student teachers' level of knowledge about CL, (b) their skills regarding the implementation of CL, and (c) the quality of lesson preparations including CL.

RO 3: Studying student teachers' competences and competency development regarding the use of CL, and the impact of an explicit training programme in this respect.

Since the general aim of this dissertation includes a focus on improving the quality of teaching practice regarding CL implementation, we will set up a training programme for pre-service student teachers taking into account the findings of an explorative study on the actual integration of CL in teacher education (RO 1). We aim to investigate the impact of this training on student teachers' competences to use this instructional strategy. Previous studies have tried to measure the impact of training programmes before (e.g. Bouas, 1996), but they mostly failed to go beyond teachers' intentions to use CL or neglected to study the competences and competency development in depth.

RO 4: Examining how student teachers prepare for CL implementation.

Based on the plea of Nijveldt (2007) and Stronge and Tucker (2003) to involve alternative sources of evidence about teachers' competence, we will investigate student teachers' competence in preparing for the use of this strategy since lesson planning may be an explanatory factor for the way CL goes in the classroom (Baylor, 2002).

RO 5: Investigating how teachers experience the use of CL implementation during practicum periods in teacher education and during their first year in the teaching profession.

Literature on educational innovations includes a strong request for more attention for teachers' experiences with innovations in an authentic context (Siegel,

2005), and for more long-term information about the impact of training. Our fifth research question comes towards these expectations by investigating the experiences of teachers with CL one and two years after the training, in case in the last year of teacher education as well as during their first year in the teaching profession.

4. Research design

To achieve the research objectives outlined above, three empirical studies were set up. Figure 1 illustrates the overall research design. It provides an overview of the empirical studies in relation to the research objectives and dissertation chapters.

First, an explorative study was set up, aiming to gain insight into the state-of-the-art of CL in pre-service teacher education (RO 1). Data for this study were collected in the beginning of academic year 2007-2008.

Second, after the development of appropriate instruments for measuring student teachers' competences related to the use of CL (RO 2), an intervention study was started during the academic year 2008-2009 in order to investigate and improve these competences (RO 3). A training programme including four 2-hour workshops on the theoretical and empirical background of this instructional strategy as well as on issues regarding the use of it in teaching practice was set up in three university colleges. Student teachers were also required to use CL during their practicum periods. Two colleges were invited to participate as a control group: student teachers in these colleges only used CL during practicum but were not explicitly trained for it. The comparison between pre- and post-test data offered the opportunity of exploring the impact of training in terms of improvements in student teachers' competences. To study the quality of lesson planning regarding the use of CL (RO 4), lesson plans from teaching practice during practicum periods were collected.

Third, we studied selected participants from the experimental condition in the training programme during two additional years (at the end of academic year 2009-2010 and 2010-2011) in order to examine their further experiences with CL (RO 5).

This dissertation combines the two major types of mixed methods research designs. First, a *mixed-method* design, referring to the inclusion of a quantitative phase and a qualitative phase of study, is used (Johnson & Onwuegbuzie, 2004). The first phase of the doctoral research, that is the exploratory study, uses a quantitative research perspective. While the second phase of study (empirical study 2) combines quantitative and qualitative approaches, the follow-up study has a pure qualitative design. Second, a *mixed-model* research design with a mix of quantitative and

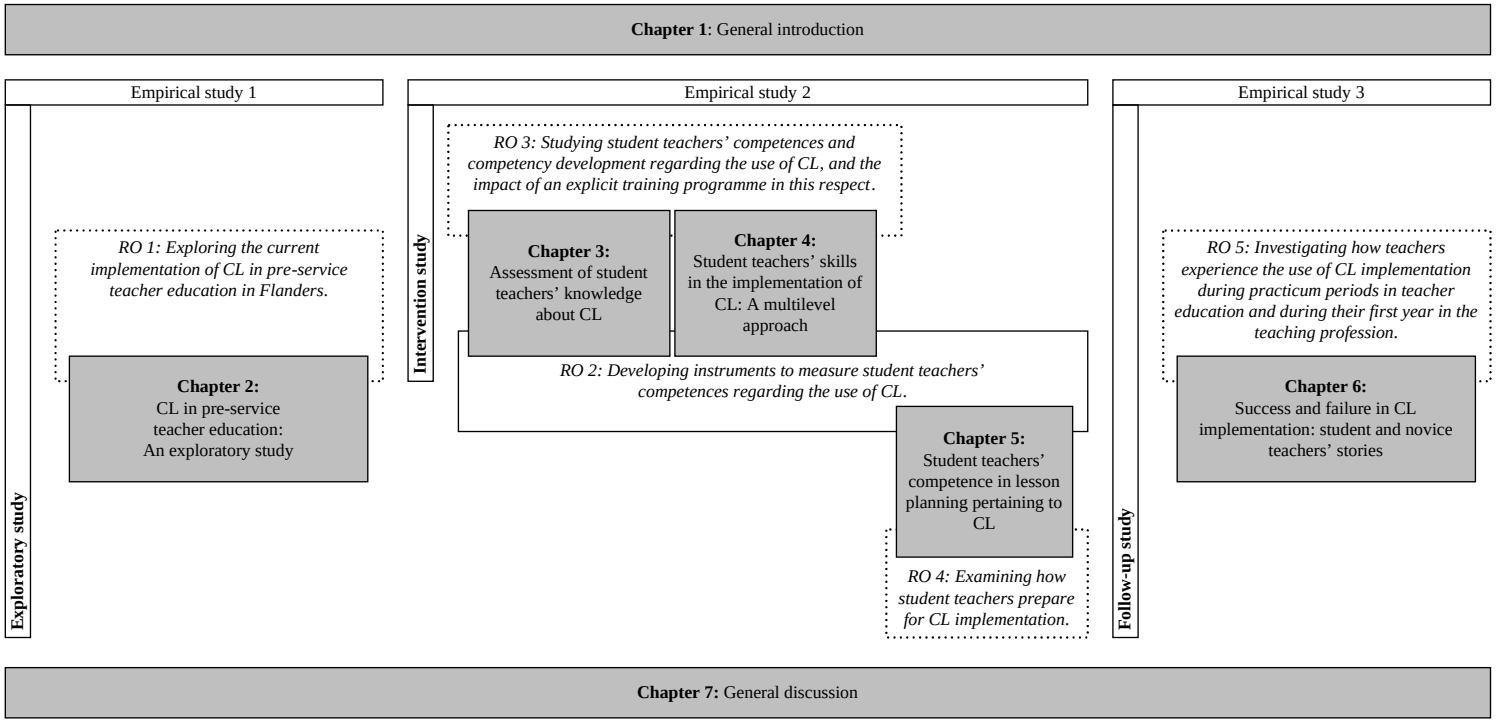

Figure 1. Schematic overview of the empirical studies in relation to the research objectives and dissertation chapters

qualitative research approaches within or across the different stages of the research process (Johnson & Onwuegbuzie, 2004), is clearly noticeable in the second phase of this dissertation. Both in Chapter 3 and 5, qualitative data are collected but analysed quantitatively.

We opt for these two types of mixed method design given the opportunity this methodological pluralism offers to draw from the strengths of both the quantitative and qualitative research tradition. The quantitative research techniques provide precise, numerical data that allow to more credibly assess relationships between variables. In addition, a larger number of participants can be involved in quantitative studies. However, the findings of quantitative studies are often more abstract, reflecting less context-based understandings. On the other hand, qualitative research has the strength of studying more in depth, reflecting participants' interpretations and experiences. It offers also the opportunity of studying dynamic processes, although it is more difficult to test hypotheses and the knowledge produced may not be generalised to other people or settings. The combination both qualitative and quantitative research is likely to result in complementary strengths and nonoverlapping weaknesses (Johnson & Onwuegbuzie, 2004; Morse & Niehaus, 2009).

Table 1 provides an overview of the different research designs, and the variety of research techniques of this dissertation in relation to the research objectives and the research goals.

Data for the explorative study were collected by means of two survey instruments. Student teachers (n = 369), spread over the three years bachelor's programme to become a primary school teacher in 16 university colleges, completed a questionnaire on their beliefs and conceptions in relation to education in general as well as regarding CL more specifically. Further, their feelings of self-efficacy in the use of CL, and the extent to which they experienced CL during their school career – from primary school to teacher education – were investigated. A second survey instrument was completed by 120 teacher educators within the same university colleges. Educational beliefs, conceptions towards CL, as well as the feelings of self-efficacy were quantitatively measured. Further, teacher educators were asked to estimate their use of CL during their lesson in teacher education. Background variables that may explain differences in the use of CL were also asked for. Descriptive analyses were used to explore beliefs/conceptions related to education and CL, and the extent of implementation of CL in teacher education. Student teachers' and teacher educators' score were compared using t-tests, whereas the influence of educational beliefs on the conceptions about CL was explored using

regression analysis. Multivariate analyses of covariance were used to explore the influence of differentiating factors in teacher educators' use of CL.

The intervention study includes a combination of quantitative and qualitative data collection. First, student teachers' pedagogical knowledge about CL was measured qualitatively by means of an assessment task with open-answer questions. At the beginning of their second year of teacher education, 210 student teachers completed the assessment task. At the end of the year, after an explicit training programme, 129 of them completed the assessment again. Data were analysed quantitatively after scoring the answers according to a content quality comparison approach (Kraiger, Salas, & Cannon-Bowers, 1995). *T*-tests were used to compare pre- and post-test scores.

Second, student teachers' CL implementation skills were measured during practicum in second year of teacher education. A reliable and valid measurement instrument was developed. Principal component analysis (PCA) was used to explore the factor structure of the scale and confirmatory factor analysis (CFA) confirmed the structure. 105 student teachers completed the (self-assessment) scale at one or more occasions during their practicum periods when they were using CL. Mentor teachers (n = 153) filled out the scale when they were observing these lessons. To compare student teachers' and mentor teachers' findings, *t*-tests were used. Multilevel repeated measures analysis made it possible to investigate (differences in) the development of skills over time.

Third, strengths and weaknesses in student teachers' lesson plans regarding the use of CL were investigated as part of this intervention study. Therefore, 323 lesson plans were collected from 100 student teachers. A scoring rubric was developed to analyse the lesson plans. The qualitative data were in this respect quantitatively analysed. Descriptive analysis were performed to study the strengths and weaknesses.

Finally, the follow-up study consisted of a qualitative study. 15 student teachers were interviewed at the end of teacher education. After about one year in the profession, a second semi-structured interview was hold with 10 of them. Data from this multiple case study were analysed to examine their motives to (not) implement CL, and to explore their experiences with success and failure in CL implementation. Within-case analysis provided insight into the particular story of each case, whereas cross-case analysis using the constant comparative approach (Strauss & Corbin, 1998) made it possible to identify similarities and differences, as well as to capture recurring patterns across the data.

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Table 1. Overview of the research objectives, the research designs, and the research techniques

Chapter	Research objective	Research goals	Research design	Research techniques
Chapter 1		*Chapter 1: General introduction*		
Chapter 2	RO 1	To explore and compare student teachers' and teacher educators' * beliefs/conceptions related to education and CL * feelings of self-efficacy in the use of CL To describe the level of use of CL in pre-service teacher education To explain differences in teacher educators' use of CL	Student teacher survey (n = 369) Teacher educator survey (n = 120)	Descriptive analysis *T*-tests Regression analysis Multivariate analysis of covariance
Chapter 3	RO 2 RO 3	To develop an adequate assessment task for measuring student teachers' pedagogical knowledge regarding CL To identify strengths and weaknesses in student teachers' pedagogical knowledge regarding CL To explore changes in student teachers' pedagogical knowledge after an explicit training programme	Pretest-posttest assessment task for student teachers (n_{pre}) = 210 (n_{post}) = 129	Content quality comparison *T*-tests
Chapter 4	RO 2 RO 3	To develop a valid and reliable instrument for measuring student teachers' CL implementation skills To examine differences in student teachers' and mentor teachers' perspective on CL implementation skills To determine the development of student teachers' skills in implementing CL over time To explain differences in the development of student teachers' skills in the use of CL	Self-assessment of student teachers' skills (n = 105) Observations by mentor teachers (n = 153)	Principal component analysis Confirmatory factor analysis *T*-tests Multilevel repeated measures analysis
Chapter 5	RO 2 RO 4	To develop an adequate instrument for the analysis of the quality of lesson plans including CL To identify strengths and weaknesses in student teachers' lesson plans including CL	Analysis of lesson plans (n = 323) of student teachers (n = 100)	Rubric scoring Descriptive analysis

Table 1 continued

Chapter 6	RO 5	To examine student and novice teachers' * motives for (not) implementing CL * experiences with success and failure during CL implementation	Multiple case study Semi-structured in-depth interviews ($n_{student\ teachers}$) = 15 ($n_{novice\ teachers}$) = 10	Within-case analysis Cross-case analysis using the constant comparative method
Chapter 7		*Chapter 7: General discussion and conclusion*		

RO = Research Objective

4. Overview of the dissertation

The findings of the three empirical studies as they are described above, are structured in seven chapters of this dissertation. Chapter 1 and 7 are general chapters introducing and summarising the three empirical studies of this dissertation. Chapter 2 to 6 are based on articles that are published or submitted for publication in international peer-reviewed journals.

The introductory chapter provides a framework for the dissertation. A review of the literature is presented to describe the theoretical background on the topic of CL. We elaborate on the effectiveness of this instructional strategy and the impact of the role of the teacher in the successful implementation, in order to come to some important implications for teacher education. Furthermore, the research objectives and research design of this dissertation are described. An overview of the different empirical studies and the final structure of the dissertation is presented.

In Chapter 2 *'Collaborative learning in pre-service teacher education: An exploratory study'* the actual position of CL in Flemish pre-service teacher education is examined. The focus is the extent to which CL is integrated in pre-service teacher education: 'How frequent is CL used as an instructional strategy during teacher educators' lessons?' and 'To what extent do teacher educators familiarise student teachers with the use of CL as an instructional strategy in primary school classes?'. Since previous studies delineated potential explanatory variables in relation to the implementation of educational innovation, student teachers and teacher educators are also surveyed on general educational beliefs, mental models, and conceptions towards CL, as well as self-efficacy in the use of CL. This chapter is based on an article published in *Educational Studies* (Ruys, Van Keer, & Aelterman, 2010).

After the exploratory study that was reported in the first chapter, an intervention study was set up in pre-service teacher education as part of this dissertation. Chapter 3 and 4 describe the findings concerning the development of student teachers' pedagogical knowledge about CL as well as their skills in the implementation of CL. Prior to the investigation of these competences, adequate research instruments were developed. They are described in the particular chapters.

Chapter 3 *'Assessment of student teachers' knowledge about collaborative learning'* comprises the development of an assessment task to measure student teachers' pedagogical knowledge about CL. In order to study this pedagogical knowledge from a wide and detailed perspective, we make use of the categories of Bloom's revised taxonomy. 210 student teachers completed the assessment task in the beginning of the academic year. After the training intervention, including training workshops and practical experiences with CL, they completed the assessment task once more at the end of the academic year. Their answers were scored following a content quality approach. The findings provide an answer to the

following research questions: (1) What are the characteristics of the pedagogical knowledge of pre-service teachers in relation to CL?; and (2) How does the pedagogical knowledge of student teachers change over one year of teacher education, and what is the influence of a training intervention in this respect? This chapter is based on a manuscript that is submitted for publication in *Learning and Instruction*.

In Chapter 4 *'Student teachers' skills in the implementation of collaborative learning: A multilevel approach'* we aim to gain insight into the skills' development of student teachers with regard to CL implementation. First, a measurement instrument was developed both for student teachers (self-assessment scale) and mentor teachers (observation scale). Second, student teachers' perceptions of their skills and mentor teachers' perspective on student teachers skills are compared. Finally, the development of student teachers' skill in the use of CL over time is investigated using multilevel repeated measures analysis. Explanatory variables are added to the model to explain differences in the development process. The article of this chapter is published in *Teaching and Teacher Education* (Ruys, Van Keer, & Aelterman, 2011).

Chapter 5 *'Student teachers' competence in lesson plans pertaining to CL'* presents a study aimed to identify strengths and weaknesses in student teachers' lesson plans including CL. For that purpose, a measurement instrument (scoring rubric) was first developed. 323 lesson plans including CL were collected from 100 student teachers, who also participated in the studies described in Chapter 3 and 4. This chapter is accepted for publication in *Journal of Curriculum Studies* (Ruys, Van Keer, & Aelterman, 2012).

In Chapter 6 *'Success and failure in collaborative learning implementation: Student and novice teachers' stories'* a qualitative case studies design is adopted to have access to particular experiences of student teachers and novice teachers with the use of CL. Semi-structured in-depth interviews are conducted with fifteen student teachers, who previously participated in the second empirical study (intervention study) of this dissertation. After one year in the teaching profession, ten of them were interviewed once more. In analysing their stories, we focus on (a) their experiences that are influencing their motives for (not) implementing CL in their teaching practice, and (b) their experiences with factors that are determining success and failure in CL implementation. This chapter is based on a manuscript that is submitted for publication in *Teachers and teaching: Theory and Practice*.

The last chapter, Chapter 7, provides a general discussion. It synthesises and integrates the findings of the preceding chapters. It also presents an overview of the main results related to the research objectives of this dissertation. This chapter includes a discussion of the limitations of the studies and possible directions for

further research. Finally, implications for theory and empirical research as well as implications for practice and policy are addressed.

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2 Collaborative learning in pre-service teacher education: An exploratory study

This chapter is based on:

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CHAPTER 2
Collaborative learning in pre-service teacher education: An exploratory study

Abstract

In this study, the actual position of collaborative learning (CL) in teacher education is examined. 120 teacher educators and 369 student teachers are surveyed on general educational beliefs, mental models, and conceptions related to CL. The self-efficacy and the implementation of CL are also taken under scrutiny. The results reveal that CL is highly valued as an instructional strategy for primary school children, however student teachers do not prefer to collaborate themselves during their learning process. Student teachers' self-efficacy towards the use of CL is moderate. CL is implemented occasionally once in a while in teacher education, but student teachers are not intensively trained in the pedagogical use of CL for their future classroom practice.

1. Introduction

As a consequence of the growing complexity and diversity in society, the formerly dominant focus on knowledge transmission in teaching processes has switched to a social-constructivist approach to teaching and learning (Carlson, 1999; de Kock, Sleegers, & Voeten, 2005; Leach & Scott, 2002; Levin, 2000; Roelofs, van der Linden, & Erkens, 2000). Active learning and cooperation with peers are central characteristics in this new paradigm. Over the last decade, researchers have become increasingly interested in collaborative learning.

Collaborative learning (CL) refers to an instructional strategy in which pupils work actively and purposefully together in small groups, with the aim to enhance both their own and their team mates' learning (Ishler, Johnson, & Johnson, 1998). In the literature, a large variety of group learning strategies are called CL. De Wever (2006), Sener (1997), and MacInnerney and Roberts (2004) argue that CL and cooperative learning are often used interchangeably. As the different names imply, some authors point at different characteristics, such as the learners' age (Sener, 1997), the philosophical roots (Panitz, 1996), the focus of working together (Panitz, 1996; Kirschner, Dickinson, & Blosser, 1996), the task structure (Curtis & Lawson, 2001), and the goal and level of pre-structuring (Strijbos & Martens, 2001). However, Strijbos and Martens (2001) and Kirschner (2001) argue that collaborative and cooperative learning also have a large number of similarities. Moreover, Bruffee

(1995) states that cooperative and CL are two versions of the same thing. Both approaches share a sense of community and share the belief that learning is an active, constructive process (Millis & Cotell, 1998). Therefore, some authors see CL as a broader, more general concept covering multiple approaches on peer collaboration, amongst which for example cooperative learning (De Wever, 2006; Meloth & Deering, 1999; Millis & Cottell, 1998; Palinscar, 2002; Rose, 2002). We agree with De Wever (2006) and Dillenbourg (1999) who argue that constructive learning contexts are ill-structured and therefore rather collaborative than cooperative. Therefore, in this study we opt for the term 'collaborative learning' which includes a more broad scope of strategies.

2. CL as a promising strategy: implications for teacher education

CL is well situated in the educational literature. Many studies focusing on the pedagogical value of CL indicate positive effects on the cognitive performance and social development of pupils (e.g., Johnson et al., 2001; Lopata, Miller, & Miller, 2003; Slavin, 1996; Slavin, 2004; Veenman et al., 2002).

However, the effectiveness of CL in educational practice is largely dependent on the pedagogical behavior of teachers (Gillies, 2006; Gillies & Boyle, 2008; Meloth & Deering, 1999; Veenman, Kenter, & Post, 2000). In preparing teachers for successful implementation of CL, professional development is crucial (Brody & Davidson, 1998; Lunenberg & Korthagen, 2005). Therefore, a challenging role is reserved for in-service and pre-service teacher education (Cohen, Brody, & Sapon-Shevin, 2004; Hornby, 2009; Ishler, Johnson, & Johnson, 1998; Veenman et al., 2002). Following Murray and Male (2005), the process of implementing CL into teacher education should be situated at two different levels. Teacher educators can implement CL as an instructional strategy in their own lessons (second order education), and in the content of their lessons they can instruct student teachers on how to apply CL in their future classroom practice (first order education). As teachers have a modelling function (Angelides, Stylianou, & Leigh, 2007), teacher educators are responsible for modelling the behaviour they expect from their students (Leikin, 2004; Loughran, 2006). Therefore, new teaching and learning methods associated with the social-constructivist paradigm must be given a prominent role in the education and training of student teachers (Niemi, 2002).

Most of the research on CL is carried out in primary or secondary schools and mainly investigated the impact of CL on pupils' learning processes. Whereas the effectiveness of CL for students is well documented, investigations into teachers' role during CL (Gillies, 2004; Meloth & Deering, 1999) and studies on CL in the context of teacher education are still underrepresented in empirical research

(Darling-Hammond & Hammersford, 2005). The research that has been carried out in this respect focused largely on the impact of several forms of CL on student teachers' learning process (Showers & Joyce, 1985; Bouas, 1996; Glass & Putnam, 1989; Watters & Ginns, 2000; Wilhelm, 1997). Other studies examined the collaborative pedagogical behaviour of senior teachers and its impact on pupils' learning processes (Antil, Jenkins, Wayne, & Vadasy, 1998; Ghaith & Yaghi, 1998; Gillies, 2006; Rich, 1990; Shachar & Shmuelevitz, 1997) or the effects of in-service staff development (Ishler, Johnson, & Johnson, 1998; Krol-Pot, 2005; Sharan & Sharan, 1987; Veenman et al., 2002). However, little is known about the professional development of pre-service student teachers regarding the implementation of CL in educational practice. Based on research of Bouas (1996), Veenman et al. (2002) explored the effects of CL (implemented during a pre-service teacher training) on student teachers' willingness and ability to implement CL. However, the current presence of CL in pre-service teacher education colleges was not investigated in both studies. In addition, teacher educators' point of view was not yet taken under scrutiny in former research.

Notwithstanding the influence of social-constructivist theory, research indicates that the implementation of associated educational innovations has been problematic (Fullan, 2001; Lunenberg & Korthagen, 2003). Baines et al. (2003) argue that teachers are often reluctant to implement CL, possibly due to a lack of competences and understanding (Gillies, 2006; Slavin, 1999; Veenman et al., 2000). Since we believe that pre-service teacher education has a challenging role in making new generations of teachers familiar with CL, the present study explores both teachers' personal background characteristics (e.g., familiarity), their beliefs/conceptions, and self-efficacy and the relation of these with the integration of CL in pre-service teacher education. These characteristics have been delineated as potential explanatory variables in relation to the success or failure of implementing educational innovations (Ghaith & Yaghi, 1997; Guskey, 1988; Rich, 1990; Glass & Putnam, 1989).

Personal background characteristics. Previous research indicates that student teachers and teacher educators' background characteristics, such as gender (Donche & Van Petegem, 2007) and year of training (Donche, Vanhoof, & Van Petegem, 2003), are related to their beliefs about CL and the degree to which they implement CL in practice. Further, Lopata, Miller, and Miller (2003) found that more experienced teachers implement CL more frequently and with greater competence. Other researchers argue that teachers face the problem of 'familiarity' (Geddis & Wood, 1997) or 'apprenticeship of observation' (Hammerness, 2005). As they have spent many years as students themselves, they have acquired a certain conception of teaching through observation. This teaching conception is often based on their

experience with knowledge transmission, with little engagement among pupils in terms of learning from one another (Lunenberg & Korthagen, 2005). As a result, innovative instructional strategies are rarely implemented in contemporary education (Tigchelaar et al., 2001).

Beliefs and conceptions. Teachers' educational beliefs can be understood as a set of representations guiding their concept of learning and instruction and their role in that process. Conceptions, on the other hand, are focused on specific topics in the instructional process (Hermans, van Braak, & Van Keer, 2008). In terms of educational beliefs and conceptions, three different approaches can be related to the implementation of an innovation.

First, teachers' educational beliefs are found to be linked to actual classroom practice (Eley, 2006; Hermans, van Braak, & Van Keer, 2008). Different conceptual labels and classifications exist in teacher thinking research, including multi-dimensional conceptualisations. However, two-dimensional systems distinguishing between teacher-centred and student-centred beliefs are paramount (e.g. Eley, 2006; Hermans, van Braak, & Van Keer, 2008; Lunenberg & Volman, 1999).

The second orientation focuses on the beliefs of students. Vermunt and Van Rijswijk (1997) distinguish five mental models of learning that can be defined as *'a coherent system of views on learning and teaching processes, which is decisive for what an individual means by learning, what learning activities he or she considers possible and desirable, which tasks in the teaching-learning process he or she considers his or hers and which tasks are destined for others'* (Lunenberg & Volman, 1999, p. 435). Based on Donche et al. (2003), it can be hypothesised that aspirant teachers who attach less importance to cooperative learning for their own learning process are expected to find cooperative learning less valuable for their pupils.

Third, conceptions towards a specific innovation seem to be a differentiating factor in the innovative practice (Abrami, Poulsen, & Chambers, 2004). The more familiar and competent teachers become in the use of an instructional strategy, the more positive their attitudes towards it and the more likely they will implement it (Veenman et al., 2002).

Self-efficacy. A crucial aspect in the successful implementation of instructional innovations is the teacher's sense of competence in the implementation of an instructional strategy. Previous research suggests that the lack of training given to teachers in relation to innovative learning strategies may have a negative influence on their sense of self-efficacy (Abrami, Poulsen, & Chambers, 2004; Veenman et al., 2002) and the degree to which they implement educational innovations. On the other

hand, Guskey (1986, 1989) argues that a high sense of self-efficacy can either promote or inhibit change in education (Pajares, 1997).

3. Method

3.1 Research questions

The present study investigates the beliefs, conceptions, and self-efficacy of student teachers and teacher educators on the one hand, and the relation with the actual implementation of CL in pre-service teacher education. Five research questions are formulated to guide this study.

a) *What are the beliefs/conceptions of student teachers and teacher educators towards education in general and towards CL in particular?*
b) *How competent do student teachers and teacher educators feel in implementing CL?*
c) *What is the impact of self-efficacy on conceptions towards CL?*
d) *How is CL actually implemented in teacher education?*
e) *Which factors explain differences in teacher educators' collaborative teaching behaviour ?*

3.2 Participants

In Flanders (Belgium), 21 pre-service teacher education colleges for primary schools were invited by mail and telephone to participate in this study. In total 16 colleges agreed to participate, with 120 teacher educators and 369 student teachers. 70.0% of the participating teacher educators were female and 37.5% had a master degree in psychology or educational sciences. Among the participating student teachers, there were 175 first-year (47.5%), 114 second-year (30.9%), and 80 third-year students (21.7%). 87.8% of the students was female, which is consistent with population data values.

3.3 Instruments

Two questionnaires were completed anonymously: a paper and pencil version for teacher educators and an online version for student teachers. All data were gathered in the beginning of the academic year 2007-2008.

Beliefs/conceptions related to teaching and learning. Student teachers' and teacher educators' beliefs regarding teaching in general were measured using the

Transmissive and Developmental dimension of the Beliefs About Primary Education Scale (BPES; Hermans, van Braak, & Van Keer, 2008). In each subscale, 9 items assess the individual's (a) developmental beliefs about education, i.e., the notion that education should be process-oriented, and (b) transmissive beliefs about education, i.e., the extent to which respondents believe education serves external goals and is outcome-oriented.

Student teachers also filled out the higher education version of the 'Inventory Learning Styles' (ILS; Vermunt & Van Rijswijk, 1997). This measure contains 48 items comprising 5 subscales concerning mental models of learning (intake of knowledge; construction of knowledge; stimulating education; use of knowledge; cooperative learning).

To measure conceptions towards CL, student teachers and teacher educators completed the Cooperative Learning Implementation Questionnaire (CLIQ; Abrami, Poulsen, & Chambers, 2004). This scale contains 48 items comprising 3 subscales (perceived value of innovation; expectancy of success; perceived cost).

All items were measured on 5-point rating scales ranging from 1 (totally disagree) to 5 (totally agree).

Self-efficacy. To measure self-efficacy, participants reported their subjective feeling of competence in relation to the instructional use of CL. This self-efficacy measure ("How competent do you feel in implementing CL"?) was scored on a 5-point Likert scale, ranging from 1 (not competent at all) to 5 (very competent).

Implementation of collaborative learning in (teacher) education. Teacher educators were asked to indicate the extent to which CL is included in the teacher education curriculum. They stated the degree to which (a) CL is implemented as an instructional strategy during the lessons they teach, and (b) they make their student teachers familiar with the pedagogical use of CL as an instructional strategy. These questions were rated on a 5-point Likert scale, ranging from 1 (never) to 5 (highly frequent).

Student teachers rated 20 instructional strategies in terms of the extent to which these are used in their current teacher education. For this measure, the classification of Hoogeveen and Winkels (1996) was used, distinguishing between tuition, interactive strategies, tasks, collaborative strategies, and play strategies.

Personal background characteristics. Teacher educators reported their gender, age (measured in eight intervals of five years), certificate orientation (eleven categories, e.g., arts, physical education, psychological and educational sciences), and the teacher training college they were employed at. Further, they also reported the number of years they were lecturing future primary school teachers and their

professional development regarding CL. The latter was measured on a 5-point Likert scale, ranging from 1 (not at all) to 5 (very frequent) in relation to continuing education activities.

For student teachers, gender, orientation of secondary education (general – arts – technical – vocational), the teacher education college, and students' level (year 1 - 2 - 3), were recorded as background variables. To assess their level of familiarity with CL, student teachers were asked to indicate their experience with CL during primary school, secondary school, and during each year of teacher education. This was rated on a 5-point Likert scale, ranging from 1 (never) to 5 (highly frequent). An example item is: *'To what extent were you introduced to CL during your own primary school time period?'*.

3.4 Data analysis

Internal consistency of the instruments was verified before further data analysis. Given the low internal consistency of student teachers' familiarity with CL, this variable was not further included in the analyses. In terms of the BPES, ILS, and CLIQ, internal consistency of most subscales was good (higher than .80), except for the 'cost of CL' subscale of the CLIQ, which was between .62 and .68 in both survey versions (Table 1). Following Nunnally (1967), however, a cut-off value of .60 can be considered acceptable. Table 1 shows item examples and the number of items retained after computing Cronbach's alpha.

All data were analysed using SPSS 15.0. Descriptive measures, *t*-tests, univariate and multivariate analysis of covariance are applied. The reported *F*-values are based on Wilks' Lambda.

4. Results

4.1 Beliefs/conceptions related to education and collaborative learning

The first question concerns the beliefs/conceptions of both student teachers and teacher educators in relation to education in general and CL in particular. Table 2 gives an overview of the descriptive results.

General beliefs. The results indicate that student teachers and teacher educators report more developmental than transmissive beliefs about education. However, for teacher educators the standard deviation of their developmental beliefs is 2.86, whereas it is only 1.25 for student teachers. This suggests a lower consensus among

Table 1. Beliefs and conceptions: Example items and number of items (*N*) for each scale

	Scales	Student teachers' survey: *N*	Teacher educators' survey: *N*	Example items
Hermans et al., 2008	Transmissive dimension	8 (α = .69)	8 (α = .63)	The main task of a teacher is to pass on knowledge and skills to the pupils
	Developmental dimension	8 (α = .78)	7 (α = .74)	Good education is always connected to the personal environment of the pupil
Vermunt & Van Rijswijk, 1997	Intake of knowledge	9 (α = .75)		I have to learn definitions and other facts by heart
	Use of knowledge	5 (α = .70)		What I learn must be useful for solving practical problems
	Construction of knowledge	9 (α = .72)		I have to look for connections in the course content
	Cooperative learning	8 (α = .82)		I prefer to perform a task together with other students
	Stimulating education	8 (α = .85)		A teacher educator has to stimulate and motivate me
Abrami et al., 2004	Value of CL	18 (α = .88)	18 (α = .89)	Engaging in cooperative learning enhances students' social skills
	Expectancy of CL	18 (α = .85)	16 (α = .88	I believe I can implement cooperative learning successfully
	Cost of CL	6 (α = .62)	7 (α = .68)	Implementing cooperative learning requires a great deal of effort

Note. The example items are all selected from the student teachers' survey instrument

Table 2. Beliefs about teaching and learning in general, and CL-conceptions

		Teacher educators (n = 120)		Student teachers (n = 369)	
		M	*SD*	*M*	*SD*
Hermans et al., 2008	Transmissive dimension	2.77	1.50	3.28	1.88
	Developmental dimension	4.02	2.86	3.98	1.25
Vermunt & Van Rijswijk, 1997	Intake of knowledge			3.74	1.78
	Use of knowledge			4.06	1.17
	Construction of knowledge			3.63	1.56
	Cooperative learning			3.12	1.13
	Stimulating education			3.41	1.00
Abrami et al., 2004	Value of CL	3.49	0.53	3.26	2.00
	Expectancy of CL	3.72	0.48	3.53	2.06
	Cost of CL	2.89	0.51	2.89	1.00

teacher educators in terms of the content and organisation of good education in primary school education.

Mental models of learning. The results indicate that student teachers prefer the use (M = 4.06) and intake (M = 3.74) of knowledge in their own learning process, which is in contrast to their preference for a developmental orientation for primary school children. Stimulation from teacher educators is considered less important by student teachers (M = 3.41), as is cooperation with other student teachers (M = 3.12). Using paired-samples t-tests, we compared the cooperative learning subscale score with the other mental models of learning. The results indicate that student teachers value cooperative learning as significantly less important for themselves than all other learning strategies (t(487, 181.183)= 2.203; p < .001).

Conceptions about collaborative learning. For the CLIQ, the results indicate that both student teachers and teacher educators expect positive results from CL implementation and estimate its value as an instructional strategy as relatively high. Teacher educators have significantly more positive conceptions about CL than their students, i.e., expectations towards CL (t(487, 173.024)= 4.792; p < .001) and the value of CL (t(487, 194.966)= 3.786; p < .001). The cost of implementing CL is rated rather low to undecided for both student teachers and teacher educators. Regression analysis indicates that the more student teachers prefer CL themselves, the more positive their attitudes towards CL as an instructional strategy for their

pupils ($F(3,196)= 7.989$; $p < .001$). The preference for the intake of knowledge is negatively related to CL conceptions ($F(3,196)= 3.028$; $p < .05$).

4.2 Relation between self-efficacy and collaborative learning and teaching

The results of the second research question indicate that both student teachers and teacher educators deem themselves only moderately competent in using CL. Teacher educators estimate their subjective feeling of competence at 3.14 on average (SD = 0.079). For student teachers, self-efficacy in relation to CL is slightly higher (M = 3.66; SD = 0.61). Surprisingly, no differences were found in student teachers' self-efficacy over the three years of teacher training.

As to the third research question, the impact of self-efficacy on conceptions of CL was investigated in a regression analysis. The results indicate that student teachers' sense of competence influences their conceptions about CL ($F(3, 365)= 13.721$; $p <$ .001). The more competent student teachers feel in implementing CL, the higher their expectations ($F(1,369)= 40.631$; $p <.001$) and their perception of the value of CL ($F(1,369)= 28.281$; $p <.001$). Accordingly, the costs related to implementing CL are rated lower in case of higher self-efficacy ($F(1,369)= 23.801$; $p <.001$).

For teacher educators the results indicate that their sense of competence has a significant influence on their CL conceptions ($F(3,116)= 10.271$; $p < .001$). The higher their self-efficacy, the higher their expectations towards ($F(1,120)= 30.602$; $p <.001$) and perception of the value of CL ($F(1,120)= 12.406$; $p <.05$). The cost related to its implementation is rated lower ($F(1,120)= 10.293$; $p <.05$).

4.3 Implementation of CL in teacher education

The fourth research question focuses on the implementation of CL in pre-service teacher education. Table 3 summarises the extent to which CL is used as an instructional strategy during teacher educators' lessons (second order education), and the extent to which teacher educators familiarise their student teachers with the use of CL as an instructional strategy in primary school classes (first order education).

More than half of the teacher educators reported that they use CL as an instructional strategy less than once a month. Student teachers are even less frequently trained in making pedagogical use of CL in their primary school classes. Only 2.5% of the teacher educators integrate this instructional strategy at least once per week during their lessons.

Next to measuring the implementation of CL from the perspective of teacher educators, we also examined the use of CL in teacher education compared to other

instructional strategies from student teachers' perspective. The results indicate that while CL is used relatively frequently in teacher education, teacher educators still mostly use traditional teaching methods in their lessons.

Table 3. Level of use of collaborative learning in pre-service teacher education

	Level of use					
	never	1 time at the most in a term of 6 months	several times in a term of 6 months	several times in a month	weekly or several times a week	not known
a	5 (3.3%)	14 (11.7%)	55 (45.8%)	26 (21.7%)	11 (9.2%)	10 (8.3%)
b	19 (15.8%)	26 (21.7%)	42 (35.0%)	12 (10.0%)	3 (2.5%)	18 (15.0%)

Notes.

(a) Use of collaborative learning as an instructional strategy during lesson in teacher education

(b) Making student teachers competent in the pedagogical use of collaborative strategies in primary schools

4.4 Differentiating factors in the collaborative teaching behaviour of teacher educators

As to the fifth question, three multivariate analyses were performed exploring the relation between teacher educators' background information, beliefs/conceptions, and self-efficacy on the one hand, and their implementation of CL on the other. The implementation of CL in teacher education was considered at both first and second order education (Murray & Male, 2005). Table 4 gives an overview of the analyses.

The multivariate results of the first analysis indicate that teacher educators' personal background characteristics account for differences in the implementation of CL in teacher education. Male teacher educators appear to use CL significantly more during their lessons than their female colleagues. Furthermore, the more teacher educators become familiar with this instructional strategy in continuing education sessions, the more frequently they use CL during their lessons and the more they pay attention to familiarising student teachers with the pedagogical use of CL.

Furthermore, while general educational beliefs do not explain differences in the implementation of CL, conceptions concerning CL in particular do: the higher the expectations of teacher educators towards CL, the more they use this instructional strategy and the more they try to make their student teachers familiar with. Teacher educators who reported valuing CL highly also reported implementing this instructional strategy to a significantly higher degree.

Self-efficacy of teacher educators concerning the implementation CL, however, does not significantly influence the degree of implementation itself.

Table 4. Impact on the implementation of collaborative learning

	Implementation of CL in teacher education				
	a		b		
	F	*p*	*F*	*p*	*df*
Personal background characteristics					
Gender	14.253	.033*	1.299	.337	(1,3)
Age	6.057	.084	1.258	.460	(6,3)
Certificate orientation	5.686	.090	1.817	.339	(9,3)
Institute	9.588	.044*	2.774	.218	(15,3)
Years of experience	5.409	.103	.012	.919	(1,3)
Continuing education	5.120	.026*	5.078	.027*	(1,90)
Beliefs and conceptions					
BPES					
Transmissive	.384	.537	.131	.718	(1,88)
Developmental	.656	.420	.067	.796	(1,88)
CL conceptions					
Value	5.145	.026*	.762	.385	(1,88)
Expectations	17.559	.000*	4.485	.037*	(1,88)
Cost	.304	.583	.005	.943	(1,88)
Self-efficacy	9?17	.341	.637	.427	(1,90)

Notes.

(a) Use of collaborative learning as instructional strategy during lessons in teacher education

(b) Making student teachers competent in the instructional use of collaborative strategies in primary school classes

* $p < .05$

5. Discussion

The aim of this study was to investigate the presence of CL in Flemish pre-service teacher education.

The first research question addressed the beliefs and conceptions of both teacher educators and student teachers towards education in general and CL in particular. In contrast with the findings of Lunenberg and Korthagen (2005), both groups favour a developmental orientation towards education for primary school children. However, the study of Lunenberg and Korthagen (2005) differed from ours since it was based on qualitative data from a limited number of teacher educators and senior teachers. Similar to the findings of Veenman and colleagues (2002) that student teachers in the Netherlands appreciate the educational value of CL for

pupils, this instructional strategy is also well accepted in Flanders. In terms of the mental models of learning, the results of this study indicate that student teachers prefer the use and intake of knowledge in their own learning process, supporting the findings of Donche et al. (2003). However, the mental models that student teachers selected for themselves are in contrast with their conceptions about CL for pupils. The results further indicate that CL as learning strategy for pre-service student teachers is valued lower than all other learning strategies. It might be hypothesised that many of these students may have had negative experiences with CL, due to problems like the free-rider effect, an unequal division of work, or an inappropriate implementation (e.g. Lopata, Miller, & Miller, 2003). Student teachers' lack of interest in collaborating with one another has two main implications. First, when student teachers are not willing to collaborate with colleagues, innovations in educational settings will be more difficult to introduce according to Swafford (1998) and Meirink (2007). Second, similar to teacher educators, school teachers are responsible for modelling the behaviour they expect from their pupils (Leikin, 2004; Loughran, 2006). In this respect, Russell (1997) argues that pupils and students are not so much influenced by what they read in books or what teachers tell them, but rather by what they see. When teachers are not open to collaborate with colleagues, they will pass this attitude on to their pupils.

The second and third question concern the state-of-the-art of self-efficacy in the relation to CL. Although student teachers and teacher educators reported only a moderate sense of competence, we found that higher self-efficacy was related to more positive conceptions towards CL for primary schools. This is in line with the findings of Veenman and colleagues (2002), who concluded that student teachers had more positive opinions about an innovative instructional strategy after a pedagogical training, i.e., their subjective feeling of competence increased because they gained experience with CL in educational practice. Therefore, professional development appears to be valuable for the competency development of both student teachers and teacher educators.

Our results indicate, however, that student teachers' year of training has no influence on their self-efficacy. Across the three years of teacher education, student teachers' self-efficacy scores in terms of the implementation of CL were not significantly different. In this respect, it can be argued that teacher education should pay more attention to student teachers' professional development with regard to CL.

The results of the fourth research question support this argument. While teacher educators reported positive conceptions towards CL, this instructional strategy was not as frequently implemented in practice as other strategies. The results indicate that teacher educators pay limited attention to instructing student teachers on how they can implement CL in primary school. As a consequence, student teachers may face the problem of using theoretical information on this innovative strategy in first

order educational practice (Tigchelaar et al., 2001). Further research should explore whether paying more attention in teacher education to the implementation of CL can increase the self-efficacy of student teachers.

The last research question focused on explanatory variables in relation to the implementation of CL by teacher educators. Contrary to the findings of Donche and Van Petegem (2007), we found that male teacher educators apply CL more often than their female colleagues. Geddis and Wood (1997) delineated several constraints to the implementation of innovative instructional strategies, such as the lack of instructional time. However, in the present study the costs of implementing CL were estimated as rather low and were not good predictors of the degree of implementation of CL. Furthermore, previous research suggests that the reason for the limited implementation of CL in teacher education is due to a lack of competence in teacher educators (Tigchelaar et al., 2001). Further research is needed to explore the differential impact of professional development activities on the degree to which CL is implemented in teacher education.

Some limitations of the present study should be acknowledged. First, the questionnaire related to familiarity with CL during compulsory education required that student teachers have a clear memory of this period. Those who could not remember this period well could indicate a 'no answer' option (Billiet, 1991), however, it has turned out that the answers were insufficient consistent.

A second limitation concerns the interpretation of the concept 'CL.' While a definition was provided in the questionnaire, some participants may not have read this, which may influence their answers.

Moreover, in this study we did not gather observational data. Several limitations of self-reported measures must be acknowledged. Borg (2006) points at potential problems of self-reported data in studying teachers: e.g. teachers' responses may be influenced by social desirability, statements are defined by researchers and may not cover the full range of beliefs respondents have, self-reported measures cannot be used to make definite claims about what teachers do in the classroom. It is therefore recommended that observational and other qualitative data are gathered in future research to verify the relationship between reported measures and observed teaching practices.

Finally, the question as to how the didactic behaviour of teacher educators influences the learning process of student teachers in relation to CL (Grossman, 2005), was not addressed in this study.

The present study supported the findings of Lopata, Miller, and Miller (2003) and Joyce and Showers (1984), in that professional development activities were found to have a significant impact on teachers' skills and the degree to which they implement

innovative instructional strategies in practice. Future studies should consider using a design-based research strategy (Collins, Joseph, & Bielaczyc, 2004) by training both student teachers and teacher educators in CL and recording observational data in combination with self-report data on competency development. The results of the present study indicate that, in terms of their own learning processes, student teachers score the mental model 'cooperative learning' rather low. However, previous research emphasises the importance of collaboration among teachers for the implementation of innovative instructional strategies to be successful (Goker, 2006; Shachar & Shmuelevitz, 1997; Showers, 1985; Showers & Joyce, 1996). The initiation of collaboration among student teachers appears to be related to an improved use of the proposed innovation in practice, i.e., the new instructional strategy tends to be used more frequently and with greater competence (Thijs & van den Berg, 2002). Future research should also investigate whether a higher implementation degree of CL also influences the learning preferences of students.

6. Conclusion

Former studies indicated that teachers' pedagogical behaviour is an important factor in making CL effective, which emphasises the crucial role of teacher education. Other research also pointed at the reluctance of teachers to implement this instructional strategy in educational practice. In this respect, the present study was set up to explore important variables in the innovative professional behaviour of student teachers and teacher educators, such as beliefs/conceptions and self-efficacy in relation to CL. Further, the aim of this study was to investigate the degree of implementation of CL as an instructional strategy in teacher education.

The results of the study contribute to the field as an explorative analysis of the current state-of-the-art in pre-service teacher education and as an important starting point for further empirical and design-based research. Both the moderate feeling of self-efficacy in the implementation of CL, and the finding that student teachers do not value CL as much as other learning strategies for their own learning, can be seen in relation to the reluctance of teachers to implement CL. In combination with a limited attention towards familiarising student teachers with the pedagogical use of CL in primary school classes, some critical problems in teacher educations regarding CL appeared in this study. The results appeal to teacher education for more training and practicing opportunities regarding CL. Design-based research can investigate the impact of the related pedagogical development making use of more objective behavioural measures, supplementary to self-report data.

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3 Assessment of student teachers' knowledge about collaborative learning

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CHAPTER 3
Assessment of student teachers' knowledge about collaborative learning

Abstract

This study explores the strengths and weaknesses in student teachers' pedagogical knowledge regarding collaborative learning (CL), as well as the changes in their pedagogical knowledge over one year of teacher education. Participants were 210 second year pre-service teachers. Four workshops on CL were provided, and they were obliged to use CL at least five times during their practicums. A pre- and post-test assessment task, making use of Bloom's revised taxonomy, was applied to measure the (changes in) pedagogical knowledge regarding CL.

Both pre- and post-test scores were rather low, except for understanding and applying CL information. Throughout the school year, they made significant progress in terms of their pedagogical knowledge regarding the application of CL information and the creation of CL environments. The more workshops student teachers attended, the larger their progress. The results of this study underline the importance of CL training and the benefits of using CL during classroom practice.

1. Introduction

Collaborative learning (CL) refers to educational processes in which two or more learners engage in a common task. In this learning process each individual is expected to depend on and be accountable for one another (Dillenbourg, 1999). During CL, the particular forms of interaction between team members, such as asking questions, debating, and explaining, encourage active and purposeful knowledge construction and ensure that everyone in the group benefits from working together (Dillenbourg, 1999; Slavin et al., 1985).

Over the last few decades CL has been studied extensively, particularly in the context of primary and higher education. Recent empirical research (e.g., Johnson, Johnson, Buckman, & Richards, 2001; Fawcett & Garton, 2005; Peterson & Miller, 2004) and meta-analytic studies (Lou et al., 1996; Marzano, Pickering, & Pollock, 2001; Slavin, 1996) indicate that this teaching method fosters progress in the (meta-) cognitive performance, social behaviour, and affective perceptions of students.

1.1 The role of the teacher in collaborative learning

While the educational benefit of CL is well documented, the role played by the teacher in facilitating the learning process during CL is, however, less understood (Darling-Hammond & Hammerness, 2005; Meloth & Deering, 1999; Webb, 2009). Nevertheless, research indicates that the effectiveness of CL in educational practice depends on the pedagogical behaviour of the teacher (Gillies, Ashman & Terwel, 2007; Gillies & Boyle, 2008; Hornby, 2009; Meloth & Deering, 1999). In this context, Veenman, Kenter, and Post (2000) state that *'simply placing pupils in groups and telling them to work together does not in and of itself produce a cooperative effort. There are many ways in which such unstructured group efforts can go wrong'* (p. 293). Unfortunately, however, research indicates that teachers are often reluctant to implement this teaching method (Baines, Blatchford, & Kutnick, 2003) as they lack the necessary competences and experience to do so (Abrami, Poulsen, & Chambers, 2004; Veenman, van Benthum, Boosma, van Dieren, & van der Kemp, 2002). In this context, Lunenberg and Korthagen (2005) argue that many teachers enter educational practice without a sound conceptual understanding of 'new' instructional strategies. Some authors suggest that they are often not familiar with the new instructional strategies because of their own experiences as learners in the classroom, i.e. their 'apprenticeship of observation' (Darling-Hammond & Hammerness, 2005; Lortie, 1975). Plourde (2002) argues that this has a strong influence on teachers' subsequent instructional behaviour. When teachers do not feel well prepared to use new instructional strategies such as CL, they lack the confidence to implement them (Shachar & Shmuelevitz, 1997).

As teachers play a central role in guiding CL, it is essential that they acquire a good grasp of its theoretical background and receive training in its practical implementation (Cohen, Brody, & Sapon-Shevin, 2004; Hornby, 2009; Ishler et al., 1998; Veenman et al., 2002). Few studies, however, have explored the process of student teachers' professional development in relation to CL and the impact or training (Ishler et al., 1998; Krol-Pot, 2005; Veenman et al., 2002). A recent study found that for pre-service primary school teachers CL does not occupy an important place in the curriculum or teaching approaches addressed during their teacher training (Ruys, Van Keer, & Aelterman, 2010; see also Chapter 2 of this dissertation). These results corroborate the findings of Veenman et al. (2002). In addition, a recent study of Hornby (2009) indicated that student teachers have only limited formal knowledge of CL. In the present study, we aim to broaden the study of Hornby (2009) and explore the pedagogical knowledge of student teachers regarding CL more in detail. Further, we want to investigate the changes in student teachers' pedagogical knowledge over one year of teacher education, including explicit training in CL.

1.2 Investigating student teachers' pedagogical knowledge

Educational research frequently aims to identify factors that lead to successful and effective learning. In this respect, the behaviour of the teacher has been found to substantially affect success in students' learning processes (Brophy, 2000; Hattie, 2002). A competency-based orientation to teacher education requires that teachers have an integrated body of knowledge, skills, and attitudes (Korthagen, 2004), in which the importance of a sound theoretical background is widely acknowledged (Verloop, Van Driel, & Meijer, 2001). In this context Carpenter, Fennema, and Franke (1996) state that *'the analysis of teachers' knowledge has become a central concern for understanding the process of teaching, for evaluating the teacher competence and for bringing about fundamental change in how teachers teach'* (p.3).

Shulman (1987) suggests seven types of knowledge that are essential for excellent teaching: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends, purposes, and values. In the study of teachers' knowledge there have been two important developments. First, the focus of research has shifted from studying teachers' knowledge of subject matter (content knowledge) to studying the teacher's pedagogical (content) knowledge. Second, while pedagogical knowledge was originally predominantly perceived as prescriptive, nowadays the teacher's personal and practical knowledge is also taken into account (Verloop, Van Driel, & Meijer, 2001). Practical knowledge is related to a specific situation or context and is developed by reflection on actions and experiences, instead of being delivered by conventional academic research (Fenstermacher, 1994). Below we discuss the first development in more detail.

Historically, teachers' content knowledge was the primary focus of teacher education research. Shulman (1987) describes content knowledge as the 'deep' knowledge of the subject itself. According to Turner-Bisset (1999), content knowledge comprises also curriculum knowledge, although this is distinguished as a separate type of knowledge in Shulman's model. Since the last decades, pure knowledge transmission as the main instructional strategy in classroom practice is considered to be less pedagogically powerful. New constructivist learning theories and joint educational research point at the value of active knowledge construction in education in relation to the demands of the current complex society. Accordingly, the importance of pedagogical knowledge, referring to the knowledge of instructional strategies, became more prominent in teacher education research (Major & Palmer, 2006).

According to Shulman (1987), teaching effectiveness requires both subject matter (content) knowledge and pedagogical knowledge. Therefore, he introduced the concept of pedagogical content knowledge (PCK), suggesting that a teacher should be able to *'transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students'* (Shulman, 1987, p. 15). A more recent wave of research studies acknowledges more emphasis to pedagogical strategies, allowing and stimulating more active engagement of the learner in the learning process, independently as well as cooperatively (Bereiter, 2002; Hargreaves, 2003; Major & Palmer, 2006). In this respect, CL as such an active instructional strategy will be further investigated in this study, in relation to the pedagogical knowledge of student teachers instead of the pedagogical content knowledge.

1.3 Aim of the study

Teachers' pedagogical knowledge about CL concerns what they have to know about this instructional strategy in order to be able to implement it successfully into practice. As mentioned above, Hornby (2009) examined the pedagogical knowledge of student teachers with regard to CL from the 'old' paradigm of investigating teacher knowledge, focussing largely on retrieving factual information. Based on research concerning the active engagement of learners in the learning process, we hypothesise that retrieving information is only a narrow interpretation of the pedagogical knowledge of teachers. Therefore, in the present study we aim to broaden the focus of Hornby's work (2009) by investigating the pedagogical knowledge of student teachers from a wider and more detailed perspective using Bloom's revised taxonomy (Anderson & Krathwohl, 2001).

The revised version of Bloom's taxonomy (Anderson & Krathwohl, 2001) suggests two separate dimensions, namely the knowledge dimension and the cognitive process dimension, which can be represented as a table where the first dimension is on the vertical axis and the latter on the horizontal axis (Anderson & Krathwohl, 2001; Krathwohl, 2002). The knowledge dimension consists of four general types of knowledge which are appropriate for all subject matters and all grades: factual, conceptual, procedural, and metacognitive knowledge (Anderson & Krathwohl, 2001). The cognitive process dimension resembles the original version of the taxonomy (Bloom et al., 1956), although important changes were made. The resulting six categories of the revised version respectively became remember, understand, apply, analyse, evaluate, and create (Anderson & Krathwohl, 2001). *Remember* refers to retrieving knowledge from long-term memory, where *understand* includes constructing meaning from instructional messages, including oral, written, and graphic communication. To carry out or use a procedure in a

known or unknown context, is called *apply*. *Analyse* involves breaking material into constituent parts and determining how parts relate to one another and to an overall structure or purpose. The last two categories, *evaluate* and *create*, stand respectively for making judgments based on criteria and standards, and putting elements together to form/reorganise a coherent or functional whole (Anderson & Krathwohl, 2001).

Taking into account these six categories of cognitive processes, the present study provides insight into the capacities of student teachers to retrieve/remember information regarding CL (as studied by Hornby, 2009) as well as their capacities to understand, apply, analyse, evaluate, and create such information. Further, we aim to study changes in the pedagogical knowledge of student teachers related to training, since this aspect is shed insufficient light on in educational research.

2. Method

2.1 Research questions

The purpose of this study is to gain insight into (changes in) student teachers' pedagogical knowledge in relation to CL and to optimise this knowledge through training. Two research questions are addressed: (1) What are the characteristics of the pedagogical knowledge of pre-service teachers in relation to CL?; (2) How does the pedagogical knowledge of student teachers change over one year of teacher education, and what is the influence of a training intervention regarding CL in this respect?

2.2 Design

To explore changes in this pedagogical knowledge after explicit training in CL, pre-test results are compared with post-test results in this study. Student teachers' knowledge of CL was measured at the beginning and at the end of the second year of their teacher education. During the academic year 2008-2009, a series of training sessions took place in which student teachers were introduced to CL and instructed on how to implement CL in practice.

2.3 Participants

Participants included second-year pre-service teachers from 5 university colleges in the Dutch speaking part of Belgium providing a 3-year bachelors degree in primary education. 210 student teachers completed an assessment task on CL in October 2008. 129 of them were questioned for a second time by the end of May 2009. Post-

test drop out was due to illness, (unofficial) withdrawal from the course, and an increased nonattendance of students due to the approaching exams. Participants (in pre-test) were aged between 18 and 27. 82% of them were female, which corresponds to the population proportion.

2.4 Training sessions concerning CL

Four training sessions of two hours were given by the first author of this study (under the supervision of the second and third authors), as a formal part of the student teachers' curriculum. The content of the sessions was based on a broad theoretical framework on collaborative teaching-learning information and the conditions for effective implementation of CL in classroom practice (Table 1). The information in the training sessions was delineated from research studies (e.g. Gillies, Ashman, & Terwel, 2007; Johnson & Johnson, 1989; Meloth & Deering, 1999), but also from practical experiences of teachers (Hiebert, Gallimore & Stigler, 2002; Lunenberg & Korthagen, 2009; Turner-Bisset, 1999; Verloop, Van Driel, & Meijer, 2001).

The training took place in a learning environment were CL was modelled and accompanied by meta-commentary, in accordance with the 'teach as you preach' principle (Loughran, 2006; Swennen, Lunenberg, & Korthagen, 2008). Student teachers did not only learn about CL information (e.g. key components and examples of CL structures), they also experienced it themselves. In addition, they discussed lesson plans with CL and developed their own instructional plans with a view to their practicums.

Training sessions took place between November 2008 and March 2009 with an interval of about one month between each session. At the end of each training session, participants rated 8 items concerning the quality and usefulness of the session (e.g. "This workshop helps me to implement CL in practice") on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Table 1 shows that most student teachers highly appreciated the training.

Taking into account that pedagogical knowledge can also be acquired through practical teaching experience (Hiebert et al., 2002; Lunenberg & Korthagen, 2009; Turner-Bisset, 1999; Verloop et al., 2001), all participating student teachers were obliged to use CL five times during their practicum in primary education. Practicum periods in primary education were spread out over the training period and lasted three to four weeks in total. For most student teachers, the final practicum period took place in May 2009.

2.5 Research instrument: Assessment task on collaborative learning knowledge

To measure student teachers' pedagogical knowledge of CL, an assessment task was developed based on the revised version of Bloom's cognitive taxonomy. Table 2 presents the assessment task for student teachers. The questions are based on current handbooks on the teacher's role in CL, referring to both the nature of CL and its implementation in classroom practice (Cohen et al., 2004; Gillies et al., 2007; Jacques, 2000; Slavin et al., 1985). All questions in the task correspond to one specific cognitive process dimension of Bloom's revised classification system.

Table 1. Training sessions on CL: content, foundation and perceived quality (max. 5)

	Content and foundation	Perceived quality
Session 1 *N* = 129	The nature of CL: Previous studies point to the importance of five key components to make CL successful in educational practice: positive interdependence, individual and group accountability, direct interaction, and paying explicit attention to both social skills and group processing (Johnson & Johnson, 1989). Teachers need to have a clear understanding of the tenets of CL, and the theoretical and empirical perspectives that have informed this practice (e.g. Gillies, Ashman & Terwel, 2007). Besides, they have to master insights concerning the translation of these key features and perspectives into practical applications that can be used in their classrooms.	*M* = 3.79 *SD* = 0.41
Session 2 *N* = 114	Pre-implementation concerns: e.g., specifying social goals, determining group size and assigning students to groups, arranging the classroom, assigning group roles, choosing between different types/structures of CL, structure positive interdependence and accountability, setting rules, constructing tasks, and giving instructions prior to CL (e.g. Jacques, 2000; Kagan, 1994; Meloth & Deering, 1999; Webb, 2009). In addition, in this sessions, student teachers were made familiar with different types of CL (e.g. JIGSAW).	*M* = 3.53 *SD* = 0.59
Session 3 *N = 125*	Points of interests during implementation: Several authors emphasise the monitoring, intervening, assisting and praising behaviour of teachers during CL (Gillies et al., 2007; Jacques, 2000; Meloth & Deering, 1999; Webb, 2009). In this respect, De Lièvre, Depover, and Dillenbourg (2006) delineate different guiding roles for a teacher during CL. Additionally, Prichard, Bizo, and Stratford (2006), and Gillies and Boyle (2008) point at the importance of teachers who provide a substantial training in CL for their pupils.	*M* = 3.84 *SD* = 0.45
Session 4 *N = 111*	Closing CL situations: Summarising, evaluating, and reflecting were emphasised as necessary tasks afterwards (Gillies et al., 2007; Jacques, 2000; Meloth & Deering, 1999; Webb, 2009).	*M* = 3.55 *SD* = 0.55

As the different cognitive process dimensions are equally present in the assessment task, the knowledge dimension focuses mainly on procedural knowledge. This is due to the fact that the implementation of CL is a central topic in the professional development of student teachers. In order to ensure face validity, the assessment task and its related scoring system were verified by an expert panel consisting of 7 senior teachers and 4 researchers.

Table 2. Assessment questions on student teachers' pedagogical knowledge regarding collaborative learning; labelled according to the knowledge dimension (KD) and cognitive process dimension (CPD) of Bloom's revised taxonomy (Anderson & Krathwohl, 2001)

	Assessment questions	KD	CPD
Q1	Provide a description of collaborative learning, including typical characteristics/components.	Factual Procedural	Remember
Q2	a) How would you as a teacher make sure that all group members contribute to the group? Give one example. b) Provide four pupil characteristics which are suitable as a basis for team composition. c) Describe an advantage as well as a disadvantage of both small and large groups in collaborative learning.	Conceptual Procedural	Understand
Q3	How would you create a lesson making use of the JIGSAW* method? Elaborate on your organisation, taking into account the information provided (grade level, number of pupils, topic, time, available sources).	Procedural Metacognitive	Create
Q4	Explain what a teacher has to do during collaborative learning when he wants to be a good coach for his pupils.	Procedural Metacognitive	Analyse
Q5	Construct a clear and concrete 'collaborative learning' regulation with five various prescripts for pupils aged 11-12.	Procedural	Apply
Q6	Read the following case and write an evaluative conclusion, including arguments, about the teacher's approach to collaborative learning.	Procedural Metacognitive	Evaluate

Note. * JIGSAW is a structured form of CL that asks students to *"undertake the necessary study to become experts and, on return, meet in groups with the experts concerned with the same topic to share and upgrade their expertise. That done, they split into crossover groups, each group containing an expert from each topic."* (Jacques, 2000, p. 120)

The open-ended assessment questions were scored on the basis of a 'closeness' measure (Kraiger, Salas, & Cannon-Bowers, 1995). This refers to a content quality comparison between a criterion answer and the student teachers' answers. Following this, a score (max. 5 for each question) was assigned by two independent raters to limit the risk of introducing bias. Horizontal scoring (i.e. when raters score the same question for all examinees before moving on to the next question) was preferred over vertical scoring (i.e., when raters score the entire assessment for each examinee) as the latter scoring process may lead to a halo effect (Allouf, Klapfer, & Fronton, 2008).

Inter-rater reliability was calculated by determining percent agreement and Cohen's kappa coefficient of correlation (Table 3) for each question in the assessment task. Following Landis and Koch (1977), a kappa higher than 0.80 illustrates almost perfect inter-rater reliability. In addition to the separate scores per cognitive process, an overall knowledge score was calculated by averaging all question scores.

Table 3. Inter-rater reliability for the scoring of the knowledge assessment task (pre-test and post-test)

	Pre-test (n = 210)		Post-test (n = 129)	
	Cohen's Kappa κ	Agreement %	Cohen's Kappa κ	Agreement %
Question 1 (remember)	0.90*	99.5 %	0.86*	88.0 %
Question 2 (understand)	0.88*	90.5 %	0.88*	87.3 %
Question 3 (create)	0.96*	98.5 %	0.89*	92.4 %
Question 4 (analyse)	0.85*	89.5 %	0.87*	89.2 %
Question 5 (apply)	0.89*	92.4%	0.97*	98.1 %
Question 6 (evaluate)	0.97*	97.6%	0.92*	93.0 %

Note. * Correlation significant at the .001-level

3. Results

As to the first research question, the results of the pre-test knowledge scores give an overview of pre-service teachers' knowledge regarding CL at the beginning of the second year of teacher education. The total score is rather low (M_{pre} = 2.14, SD_{pre} = 0.59). Table 4 summarises the descriptive statistics for the separate cognitive processes of Bloom's taxonomy. Although *'remembering'* information on CL is the lowest level of the cognitive process dimension, student teachers only show little formal knowledge of what CL exactly is. More specifically, student teachers' answers are superficial and largely descriptive, defining CL as 'group work', 'learning in a group', etc. The results for *'understanding'* and *'applying'* information about CL indicate that student teachers score well (respectively M_{pre} = 3.75 and M_{pre} = 3.80) in the pre-test. For *'analysing'* the teachers' role during CL, scores are low as well (M_{pre} = 1.95). In pre-service teachers' answers, the organisational role of the teacher appears to be the predominant theme, with only a few answers referring to social, (meta-) cognitive, or affective aspects of guiding CL. For the highest levels of cognitive processing, student teachers do poorly, scoring on average 1.71 for *'evaluating'* and 0.48 for *'creating'* in the pre-test. For the evaluation of information

on CL, the student teachers' answers more particularly indicate again that the organisational role of the teacher is a predominant theme.

The second research question focuses on change in student teachers' pedagogical knowledge in relation to CL. Descriptive analyses were performed on the post-test data and paired sample t-tests were used to assess pre- to post-test changes. The results indicate that in general student teachers score slightly better at the end of the academic year (M_{post} = 2.30, SD_{post} = 0.51). As shown in Table 4, student teachers score higher on most cognitive processes, except for 'remembering' and 'analysing' CL information. The progress is significant for 'applying' information ($t(128) = -2.861$; $p < .05$; $d = 0.36$) and 'creating' CL environments ($t(128) = -3.202$; $p < .05$; $d = 0.34$).

Table 4. Means and standard deviations of the knowledge scores (max.5) for both pre- and post-test

	Pre-test (n = 210)		Post-test (n = 129)		Pre- vs. Post-test (n = 129)	
	M	*SD*	*M*	*SD*	*M diff.*	*SD diff.*
Level 1: remember	1.13	0.55	1.04	0.71	-0.09	+0.16
Level 2: understand	3.75	0.86	3.86	0.63	+0.11	-0.23
Level 3: apply	3.80	1.37	4.19	0.94	+0.39*	-0.43
Level 4: analyse	1.96	0.93	1.99	0.91	-0.03	-0.02
Level 5: evaluate	1.71	1.15	1.85	1.19	+0.14	+0.04
Level 6: create	0.48	0.87	0.82	1.03	+0.34*	+0.16

*Note. * Significant at the .05 level*

In order to explore the relationship of these significant changes in student teachers' knowledge regarding CL and the training sessions received, a multivariate analysis of covariance was performed. Not all student teachers in our sample attended every training session (see Table 1), therefore we took the number of training sessions attended (quantitative part) and the perceived quality of the training (qualitative part) into account as independent variables.

The results indicate that the number of training sessions students attended ($F(7,88) = 2.824$; $p < .05$; partial $\eta^2 = .18$) accounts for significant changes in their pedagogical knowledge. Examining the changes in scores on the knowledge task for the separate cognitive processes indicates that the number of training sessions attended significantly affected the progress in student teachers' ability to 'apply' ($F(1,102) = 9.844$; $p < .05$; partial $\eta^2 = .10$) and 'analyse' ($F(1,102) = 8.940$; $p < .05$; partial $\eta^2 = .09$) CL information. The more sessions student teachers attended, the larger the increase in their knowledge task scores between pre- and post-test. No effect was found for the perceived quality of the sessions.

4. Discussion

Research indicates that the effectiveness of CL largely depends on teachers' competence (Gillies, Ashman, & Terwel, 2007; Hornby, 2009; Veenman, Kenter, & Post, 2000). The major aim of the present study was to explore the strengths and weaknesses in student teachers' pedagogical knowledge regarding CL, as well as the changes in their knowledge over one year of teacher education (including a training intervention with regard to CL).

The first research question focused on the characteristics of student teachers' pedagogical knowledge related to CL in terms of strengths and weaknesses. In order to provide a differentiated perspective on student teachers' knowledge concerning CL, we included the different knowledge types and levels proposed in Bloom's revised taxonomy (Anderson & Krathwohl, 2001).

The results indicate that student teachers experience difficulty remembering information about CL, which supports the findings of Hornby (2009) who states that student teachers lack factual knowledge about CL. Even after the training, most student teachers were not able to name the five key principles of Johnson and Johnson (1989), although these principles are essential for effective CL implementation (Hornby, 2009; Johnson & Johnson, 1989). This result raises questions about student teachers' design of lessons with CL: do they use particular CL structures (e.g. JIGSAW) whereby they assume that the key principles are guaranteed, or do they design lessons with CL without taking into account these principles?

Both at pre- and post-test, student teachers scored however well on the questions about understanding and applying CL information. They appear to have insight into relevant considerations with regard to group composition and prescripts in CL. Given the low scores on 'remembering', the relatively positive scores for understanding and applying CL information are rather surprising and raise questions about the cumulative hierarchical assumption of the original taxonomy of Bloom and colleagues (1956). The assumption of hierarchy is based on the idea that a higher level of cognitive processing can only be reached by mastering the lower levels first (Krathwohl, 2002). In this respect, we may expect student teachers to score low on understanding and applying CL information. However, the results of the present study do not provide evidence for this strict accumulation. The findings more particularly suggest that pre-service teachers are able to score well on 'understanding' and 'applying' CL information without high scores on the lowest level of the dimension, i.e. 'remembering' this kind of information. This finding corroborates previous studies suggesting that only a gradual structure from simple to complex exists for cognitive processing instead of a cumulative hierarchy (Anderson & Krathwohl, 2001; Krathwohl, 2002). Moreover, the findings of the present study

may be explained from the difference in focus of the taxonomy levels: 'remembering' is highly related to the presentation of theoretical information whereas 'understanding' and 'applying' are clearly more linked to the practical use of CL. Student teachers may be less able to make pedagogical theoretical knowledge explicit, whereas they can use this implicit knowledge in practical applications (e.g. group composition).

The findings of the present study with regard to 'analysing' and 'evaluating' CL situations revealed that these student teachers interpret the teacher's role during CL predominantly from an organisational point of view. Both in the analysis of essential teacher behaviour as in the evaluation of a case with regard to the role of the teacher during CL, student teachers seldom mention aspects with regard to metacognitive or socio-affective guiding of the pupils. In addition, it is also striking that this limited view did not change significantly at post-test assessment. In this respect, we assume that student teachers will guide the CL processes of pupils during CL predominantly in an organisational way, not challenging the pupils cognitively or guiding them in working efficiently together. Although the training session were designed on the basis of a thorough theoretical and empirical framework, it is possible that (a) the training sessions were insufficiently integrated in student teachers' curriculum, (b) the number of training sessions was too restricted, or (c) there was a too large discrepancy between the content or pedagogical approach of the training sessions on the one hand, and the teaching 'culture' in the colleges on the other hand.

Finally, the highest level of Blooms revised taxonomy is 'creating' (Anderson & Krathwohl, 2001). The results indicate that student teachers have difficulties with creating a lesson proposal integrating CL. It became apparent that student teachers did not include how they will guarantee key principles of CL in their lesson plans. However, it is possible that student teachers were lacking motivation to elaborate on a fictive lesson preparation in the assessment task, since the assessment had no summative function. Further, it could be that they were lacking factual knowledge about JIGSAW, i.e., a specific structured form of CL they were asked to write the lesson plan about. Future research is needed to explore the 'creating' capacities of student teachers in an authentic context, in which they are not constrained in the choice of type of CL to use.

The second research question addressed the changes in the pedagogical knowledge of student teachers with regard to the implementation of CL. After the training and practicums, student teachers' scores on the design of prescripts in CL (taxonomy level: apply) improved significantly. In addition, student teachers' scores on creating a lesson plan including CL increased significantly throughout the year, although the average post-test score was still low (M_{post} = 0.82). We may assume that their

experiences with the practical implementation of CL provided insights to them into the pitfalls of it and ways to overcome them in consultation with the pupils or to overcome them by a well-elaborated lesson plan. The results of the second research question indicate in this respect that the training plays a part in the student teachers' achievements: the more training sessions student teachers attended, the better their scores in the post-test assessment. This finding suggests that explicit training is important for their professional development and knowledge development regarding the implementation of CL. In this study all training sessions were provided by the same person, guaranteeing the same content and approach of the sessions in the different participating university colleges. As stated before, is it however unclear how this intervention fitted into the training culture of the colleges.

Nevertheless, some limitations of the present study are to be discussed. First, it is important to stress that the information gathered from the assessment task is only focused on the pedagogical knowledge of student teachers at the level of different cognitive processes. The present study did not address students' actual skills in implementing CL in practice. In order to investigate their actual CL implementation skills, an analysis of their pedagogical behaviour is necessary. Following the present study, future studies should explore the link between student teachers' CL knowledge and their skills in the implementation of CL.

Secondly, the cognitive processing dimension of Blooms' revised taxonomy is operationalised by only one knowledge question per level. It was our decision, however, not to include more than one question per level in order to avoid overburdening participants in the assessment task since the present assessment task took about three quarters to one hour to complete. In the development of the assessment task an expert panel was involved to ensure the validity and reliability of the task. Given the large time interval between pre- and post-test, it was not necessary to develop different versions of the task for both measurement moments since the learning effect of the first task will be limited after more than half a year.

Third, we were not able to investigate the 'absolute' impact of the teaching experiences of student teachers during their practicum on their pedagogical knowledge with regard to CL. Although they all used CL at least five times, their experiences and the feedback received from mentor teachers on their preparation and pedagogical behaviour may have been different. This form of assessment *for* learning can be a strong stimulus for their professional development in general and the development of their pedagogical knowledge more specifically (Tillema & Smith, 2009). It may be interesting for future studies to explore the differential impact of the practical experiences of student teachers compared to the training sessions.

Fourthly, working in the authentic context of teacher education colleges was opted for to obtain more valid results for teacher education practice. However, this implied that it was not possible to include a control group in the current study to investigate the influence of the training, given the small enrolment and high rate of withdrawal in the second year of teacher education. In addition, ethical guidelines in the teacher education colleges asked for a comparable training for each student with a view to an equal treatment during the courses.

In summary, the results of this study broaden the perspective of Hornby (2009) on the pedagogical knowledge of student teachers with regard to CL. The present results indicate that pre-service teachers are lacking a sound pedagogical knowledge regarding CL, although they appear to 'understand' CL implementation well and they have sufficient capacities to 'apply' CL information. Pre-service teachers' procedural knowledge with regard to 'applying' CL information or 'creating' CL lessons improved significantly during an academic year in which training sessions on CL were provided and CL was used during teaching practicums. This finding emphasises the importance of teacher training in accordance with the 'teach as you preach' principle (Loughran, 2006; Swennen, Lunenberg, & Korthagen, 2008) in the development of the professional, pedagogical knowledge base of student teachers. The professional development of student teachers' skills in relation to CL should be further explored by observation in authentic classroom contexts to validate these findings.

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4

Student teachers' skills in the implementation of collaborative learning: A multilevel approach

This chapter is based on:

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CHAPTER 4
Student teachers' skills in the implementation of collaborative learning: A multilevel approach

Abstract

This study explores the development of student teachers' skills in implementing collaborative learning (CL) using a multilevel repeated measures design. Participants were 105 pre-service teachers that were trained in CL implementation. The results indicate that student teachers generally perform well in implementing CL. Further, it appears that these skills increase over time, although no linear growth can be found. Student teachers' skills development appears to be positively connected with their general feeling of teaching efficacy. Surprisingly, training and students' pedagogical knowledge have no significant impact.

1. Introduction

Collaborative learning (CL) can be defined as an instructional strategy in which two or more learners are expected to depend on and be accountable for their own and one another's learning process (Dillenbourg, 1999). Although this term is often used interchangeably with 'cooperative' learning, we prefer the concept of collaborative learning as a broader, more general concept covering multiple approaches on peer collaboration, amongst which for example cooperative learning, peer tutoring, discussion groups, et cetera (De Wever, 2006; Dillenbourg, 1999; Meloth & Deering, 1999).

1.1 The role of the teacher and teacher education in CL

Researchers agree that the use of CL in classroom practice positively affects both the (meta)cognitive performance, social behaviour, and affective perceptions of students (Fawcett & Garton, 2005; Johnson, Johnson, Buckman, & Richards, 2001; Marzano, Pickering, & Pollock, 2001). However, the effectiveness of this instructional strategy largely depends on the role of the teacher guiding the learning process (Gillies, Ashman, & Terwel, 2007; Hornby, 2009; Meloth & Deering, 1999; Oortwijn, Boekaerts, Vedder, & Strijbos, 2008). Although there is consensus on the importance of the teacher role in CL, this is far less studied than the effectiveness for students.

Yet, teachers often report that they are lacking the competences and experience to implement CL effectively in teaching practice (Abrami, Poulsen, & Chambers, 2004; Baines, Blatchford & Kutnick, 2003; Gillies & Boyle, 2010; Meloth & Deering, 1999; Slavin, 1999). This finding emphasises the importance of training teachers in integrating CL (Lopata et al., 2003). In this respect, teacher education functions as a prominent context where student teachers can improve their knowledge and skills regarding the use of CL (Cohen, Brody, & Sapon-Shevin, 2004; Ishler, Johnson, & Johnson, 1999; Veenman, Van Benthum, Boosma, van Dieren, & Van der Kemp, 2002). Therefore, the present study aims to enlighten the skills of student teachers with regard to the implementation of CL and the evolution in these skills during one year of teacher training.

1.2 Essential pedagogical knowledge and skills regarding the implementation of CL

It was found that teachers need to have a clear understanding of the basic tenets of CL, and the theoretical and empirical perspectives supporting this practice (Gillies et al., 2008). In the literature, the five CL key components of Johnson and Johnson (1999) are referred to as successful for teaching practice: positive interdependence, individual accountability, direct interaction, social skills, and the evaluation of the process. Positive interdependence refers to linking group members in such a way that they cannot succeed unless the others of the group succeed. Individual accountability ensures that each group member has responsibilities for his own learning as well as for helping other group members learn. Further, teachers implementing CL have to guarantee that students can interact face-to-face. CL not only aims at cognitive performance, but also social skills are explicitly part of the learning process and output. Finally, teachers should pay attention to the evaluation of the group process. Teachers often only evaluate the product or the cognitive results of students' teamwork. However, reflecting on the way students collaborated and on how they can improve their learning process is at least equally important. In this respect, the teacher should summarise, evaluate, discuss, and reflect on the CL process together with the students (Gillies et al., 2008; Jacques, 2004; Meloth & Deering, 1999; Webb, 2009).

Teachers should have insight in how to structure these key components in the classroom, in order to avoid the free-rider effect, conflicts in the group, etc. These concerns are often considered prior to the implementation of CL, and lead to decisions about specifying social goals, determining group size and assigning students to groups, arranging the classroom, assigning roles, setting rules, designing tasks, etc. (e.g. Jacques, 2004; Gillies & Boyle, 2010; Gillies et al., 2008; Meloth & Deering, 1999; Webb, 2009).

In addition to the abovementioned key components, teachers should expressly pay attention to their guiding behaviour and interventions during the collaborative process as well. A teacher needs to know whether, when, and how to intervene. Several authors emphasise the monitoring, intervening, assisting, and praising behaviour of teachers during CL (e.g. Gillies et al., 2008; Jacques, 2004; Meloth & Deering, 1999). De Lièvre, Depover, and Dillenbourg (2006) more specifically distinguish five different guiding roles for a teacher during CL: a cognitive, affective, metacognitive, social, and organisational role. From a cognitive point of view, the teacher focuses on the content of the task and assists students by e.g. linking, structuring, analysing, etcetera. Affective guiding activities deal with feelings arising during CL. It is the task of a teacher to encourage students and make them experience that working together is fun and worthwhile. The metacognitive guidance is aimed at regulating the cognitive and affective learning whereas the social role is focussed on helping students to share their ideas and construct knowledge together. The organisational role has to do with organising the learning process, including making appointments, distributing materials, etc.

In summary, essential pedagogical knowledge and related skills are delineated during different phases of a lesson with CL, more specifically the introduction, the processing and the consolidation or evaluation phase. Studies on the knowledge base of student teachers in relation to CL yield, however, disappointing results: student teachers are found to have only a limited pedagogical knowledge base about CL as an instructional strategy (Hornby, 2009; Ruys et al., 2012; see also Chapter 3 of this dissertation). Since the pedagogical knowledge base is presumed to form the basis of teaching skills (Hoyle & John, 1995), we can hypothesise that the practical use of CL in teaching practice will be less effective when student teachers are lacking the underlying knowledge.

1.3 Additional teacher and contextual characteristics influencing the implementation of CL

In addition to teachers' pedagogical knowledge base and skills, also other personal and contextual features appear to be correlated with teachers' pedagogical behaviour in CL implementation and with their willingness to implement this instructional strategy.

Corresponding to student teachers' limited pedagogical knowledge base regarding CL, they report feeling insufficiently prepared to use CL in practice (Abrami et al., 2004; Shachar & Shmuelevitz, 1999). In this respect, the lack of competence influences their *self-efficacy*, resulting in a lack of courage to put this instructional strategy into practice (Baines et al., 2003). However, other studies also refer to the reverse relationship, that is that the amount of self-efficacy can function

as an inhibiting factor in the competency development of teachers. As Tschannen-Moran and Hoy (2001) discovered, student teachers with higher feelings of self-efficacy are more resilient and persistent in putting effort in their professional development process. Since the present study focuses on the skills development process of student teachers as a dependent variable, we will take self-efficacy into account as an explanatory variable.

It might not be surprising that professional development courses, teacher *training*, and practical experiences positively influences both competence and self-efficacy (Gillies & Boyle, 2008; Ishler et al., 1998; Krol-Pot, 2005; Veenman et al., 2002). In addition, Abrami et al. (2004) refer to the strong impact of teacher *conceptions* about CL on the willingness to use CL as an instructional strategy in the classroom.

However, it is widely acknowledged that teachers often have difficulties in applying the theory presented in professional preparation courses into practice (Korthagen, 2001). Therefore, Hoban (2005) and Verloop, Van Driel, and Meijer (2001) emphasise that teacher behaviour in the classroom is also largely influenced by *contextual factors* such as the classroom climate, the curriculum, the teaching subject etc. Therefore, contextual factors have to be taken into account as well when investigating the implementation of CL.

1.4 Aim of the present study

The literature provides evidence for both the effectiveness of CL for pupils, as well as for the important role of the teacher in the implementation of this strategy. Given the fact that teachers report a lack of competences in the use of CL, the importance of training in CL for teachers is clearly emphasised. The purpose of the current study is to explore the skills of pre-service student teachers in relation to the implementation of CL. More specifically, the extent to which student teachers succeed in bringing CL into practice in primary school classrooms is studied, as well as their skills development over one year of teacher education. Taking into account the issues about influential teacher and context characteristics, we will also explore the impact of pedagogical knowledge, self-efficacy, conceptions, and contextual variables on the performance and skills development of student teachers.

2. Method

2.1 Research questions and hypotheses

This study aims to gain insight into the skills of student teachers in pre-service teacher education with regard to the implementation of CL.

Three research questions were formulated.

a) How do student teachers' skills in relation to the implementation of CL develop? We expect skills to improve over successive lessons during their practicum.
b) What is the relationship between the self-efficacy, the knowledge base, and the conceptions of student teachers on the one hand and their skills development on the other hand? We hypothesise that a higher self-efficacy will be related to better skills regarding the implementation of CL. In addition, we expect students who participated more in training on CL and with a more extensive knowledge base to perform better as to the implementation of CL. Further, we expect that student teachers with less positive conceptions towards CL will be less motivated to implement this strategy conform their competences. Therefore, we hypothesise that conceptions towards CL and reported skills are positively related.
c) What is the relationship between contextual classroom variables (lesson subject and grade) and student teacher performance during the implementation of CL?

2.2 Participants

The participants comprised of 105 student teachers (aged 19-22 years), enrolled in the second year of a bachelor course in primary education of four university colleges in Flanders (Belgium). In addition, 153 senior primary school teachers (mentors) in participating as observers during the practicum of the student teachers were involved in this study in order to validate the skills evaluation instrument (ECLIS, see below). Senior teachers had on average 16 (*SD* = 9.67) years of experience as a primary school teacher.

2.3 Procedure

Data were collected by means of different methods and on different moments throughout the academic year 2008-2009. In October 2009, student teachers completed a questionnaire on self-efficacy and conceptions about CL. In addition, student teachers' knowledge about CL was assessed. Thereafter, four 2-hour training workshops covering essential pedagogical knowledge about CL, led by the first author of the article, were provided to all student teachers involved in the study. The number of training workshops student teachers attended was recorded. In addition, between November 2009 and May 2010, student teachers used CL as an instructional strategy in their practicum. A wide variation of different collaborative instructional strategies were used by the student teachers: cooperative learning

strategies (e.g. JIGSAW), peer tutoring, carousel brainstorming, numbered heads together, etcetera. During these lessons, student teachers were observed by their mentors who evaluated their skills regarding the implementation of CL. Student teachers themselves scored their own skills as well using a self-evaluation form.

2.4 Instruments

Questionnaires on self-efficacy and conceptions

A paper and pencil questionnaire was completed by student teachers, including background characteristics (e.g. age, gender, …), self-efficacy measures, and measures of conceptions towards CL. General teaching efficacy was measured by the short version of the Teachers' Sense of Efficacy Scale (TSES; Tschannen-Moran & Woolfolk Hoy, 2001), using a 5-point Likert scale ranging from 1 (not at all) to 5 (a great deal) (e.g. *'How much can you do to control disruptive behaviour in the classroom?'*). In addition, self-efficacy in relation to the pedagogical use of CL was measured using the Implementing Collaborative Learning Efficacy Scale (ICLES; 16 items), which we developed using the same 5-point Likert scale (e.g. *'To what extent are you able to verify that all pupils are contributing during CL?'*). Both scales show an acceptable to good internal consistency (Cresswell, 2004), respectively Cronbach's α = 0.75 for the TSES, and Cronbach's α = 0.82 for the ICLES.

To measure conceptions towards CL, student teachers completed the 48 items of the Cooperative Learning Implementation Questionnaire (CLIQ; Abrami et al., 2004) on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). This questionnaire investigates (student) teachers' conceptions regarding both the value, cost, and expected success of CL (α = 0.80). An example item is: *'Cooperative learning is an efficient classroom strategy.'*

Assessment of pedagogical knowledge base

To measure student teachers' pedagogical knowledge of CL, an assessment task was developed (Ruys et al., 2012; see also Chapter 3 of this dissertation). The questions are based on current handbooks on the teacher's role in CL, referring to both the nature of CL and its implementation in classroom practice (Cohen et al., 2004; Gillies et al., 2007; Jacques, 2000; Slavin et al., 1985). An exemplary item is: "How would you as a teacher make sure that all group members contribute to the group? Exemplify with an example". All questions in the task correspond to one specific cognitive process dimension of Bloom's revised taxonomy (Anderson & Krathwohl, 2001).

The open-ended assessment questions were scored on the basis of a 'closeness' measure (Kraiger, Salas, & Cannon-Bowers, 1995). This refers to a content quality comparison between a criterion answer and the student teachers' answers. Following this, a score (maximum 5 for each question) was assigned by two independent raters to limit the risk of introducing bias. In order to ensure face validity, the assessment task and its related scoring system were verified by an expert panel consisting of 7 senior teachers and 4 researchers. Inter-rater reliability was calculated by determining percent agreement (between 89.5% and 99.5 %) and Cohen's kappa coefficient of correlation (between 0.85 and 0.97 for each question in the assessment task). These kappa values illustrate almost perfect inter-rater reliability according to Landis and Koch (1977). In addition to the separate scores per cognitive process dimension of Bloom's revised taxonomy, an overall knowledge score was calculated by averaging all question scores.

Assessment of skills in implementing CL

Since the assessment and appraisal of practice teaching lessons is one of the key elements in teacher preparation programs (Tillema, 2009), student teachers' skills during authentic lessons of a practicum period are studied. In the context of this study students' self-assessment is used to gain insight into their CL implementation skills, since student teachers themselves are increasingly supported to become reflective practitioners (Schön, 1987).

Since no adequate instrument existed to measure student teachers' skills regarding the implementation of CL, we developed the Evaluation of Collaborative Learning Implementation Scale (ECLIS) in a version for mentors (observation form) and for student teacher (self-evaluation form). The ECLIS is developed based on the literature on CL (e.g. De Lièvre et al., 2006; Gillies et al., 2008; Jacques, 2004; Krol-Pot, 2005; Meloth & Deering, 1999; Slavin et al., 1985; Webb, 2009) in order to delineate important issues in ensuring the effectiveness of this instructional strategy when using it in primary school teaching practice. Experts in the field of educational research as well as senior teachers were asked to review the items to ensure that they did not include any lacunas. A selection of 41 items was derived from the initial pool, covering three different phases in CL lessons, namely the introduction phase (IP), the processing phase (PP), and finally the plenary consolidation phase (CP). The IP refers to any task the teacher takes up by the start of CL, such as clarifying the assignment of setting rules (e.g. *'The teacher makes clear agreements about timing'*). In the PP, we included the five guiding roles of De Lièvre et al. (2006) as well as the realisation of the five key components of Johnson and Johnson (1999). An example item is: *'The teacher encourages every child to participate'*. The items of the CP included teacher tasks related to reflection and

evaluation of the collaborative product and process (e.g. *'The teacher discusses the collaborative process'*).

Each student teacher completed the ECLIS at least one time and five times at the most (range 1-5), scoring one's own behaviour immediately after the implementation of CL on a 10-point scale ranging from 1 (*very bad or absent behaviour*) to 10 (*excellent*). On each form, additional information concerning the lesson (e.g. subject of the lesson, grade, number of pupils,…) was completed.

During the first lesson with CL of the student teacher, his mentor teacher completed the ECLIS instrument as well in order to validate the ECLIS. In total, the ECLIS was completed 372 times by student teachers and 105 times by mentors.

2.5 Data analysis

Exploratory and confirmatory factor analysis

Principal axis factoring (PAF) with oblique rotation ($\delta = 0$) was used to examine the factor structure of each phase distinguished in the ECLIS in both samples. Due to the likelihood that the hypothesised factors in the second (processing) phase would be correlated, this analysis afforded the most interpretable structure. The analyses were done on the data of student teachers' first measurement occasion ($n = 105$) , whereas in a later stage the analyses were done on the data of the mentor teachers ($n = 105$) to validate the factor structure of the student teacher dataset.

KMO statistic (>0.85) and Bartlett's test ($p = 0.000$) indicate the validity of the samples. The PAF analysis resulted in six different factors each with an eigenvalue greater than 1. Considering parsimony, only items with a factor loading of 0.40 or higher were included in the final version of the ECLIS. Table 1 gives an overview of the factor loadings and illustrates the good reliability of the scales. Item 17 and 18 were removed from the final version of the ECLIS due to loo low factor loadings. Further analyses were done on the student data since the mentor teachers were always different per student teachers, making differences in their scores less accountable to differences in skills.

The validity of the ECLIS was verified by confirmatory factor analysis (CFA) on each phase of implementing CL in the student teachers' dataset. The results pointed at an acceptable model fit (Byrne, 2001): (1) for the introduction phase $\chi^2 = 108.316$, $df = 44$, $p < 0.001$; RMSEA = 0.048; GFI = 0.97; AGFI = 0.95; CFI = 0.985, (2) for the processing phase $\chi^2 = 694.204$, $df = 170$, $p < 0.001$; RMSEA = 0.069; GFI = 0.905; AGFI = 0.870; CFI = 0.945; and (3) for the consolidation phase $\chi^2 = 9.490$, $df = 5$, $p > 0.05$; RMSEA = 0.037; GFI = 0.995; AGFI = 0.979; CFI = 0.998. Since the ECLIS turned out to be a valid and reliable instrument for

Table 1. Principal axis factoring (oblique rotation, $\delta = 0$) of student teachers (ST)' scores (n = 105) and mentor (scores (n = 105)

	introduction phase			processing phase									consolidation phase	
	ST	M		ST				M					ST	M
	F1	F1		F1	F2	F3	F4	F1	F2	F3	F4		F1	F1
Item			*Item*									*Item*		
01	0.42	0.53	13				-0.47				-0.53	36	0.65	0.86
02	0.65	0.70	14				-0.93				-0.45	37	0.69	0.80
03	0.54	0.80	15				-0.63				-0.52	38	0.81	0.95
04	0.71	0.75	16				-0.62				-0.65	39	0.70	0.86
05	0.71	0.88	17									40	0.72	0.79
06	0.68	0.82	18									41	0.57	0.81
07	0.77	0.80	19		-0.45				.76					
08	0.58	0.78	20		-0.69				.83					
09	0.66	0.82	21		-0.50				.72					
10	0.79	0.91	22		-0.79				.69					
11	0.58	0.84	23		-0.50				.81					
12	0.61	0.87	24		-0.76				.84					
			25		-0.41				.74					
			26			0.61				0.89				
			27	0.63				-0.58						
			28	0.69				-0.70						
			29			0.76				0.63				
			30				-0.41				-0.60			
			31			0.59				0.82				
			32	.71				-0.47						
			33	.69				-0.67						
			34			0.76				0.59				
			35				-0.55				-0.70			
n	12	12	*n*	4	7	4	6	4	7	4	6	*n*	6	6
α	0.89	0.95	α	0.84	0.89	0.82	0.85	0.87	0.93	0.87	0.86	α	0.84	0.94

measuring student teachers' skills with regard to the implementation of CL in primary schools, it was further used to answer the research questions of this study.

The latent correlations among the six factors of the ECLIS ranged from 0.53 to 0.71 (p's <0.001). Further, the subscales all loaded on the same latent second-order factor ('CL implementation skills'), with standardised factor loadings ranging from 0.72 to 0.84 (p's < 0.001) These results show that (a) the subscales are only moderately correlated, whereas (b) they still represent the same underlying construct. Therefore, we examined the multilevel results for 'CL implementation skills', as well as for each of the ECLIS-factors separately.

Multilevel analyses

A two-level structure needs to be considered in analysing the data, with the student teacher as the highest level. As the participating student teachers' skills were scored during several successive lessons with CL (lowest level in the structure), data are available to analyse skills' development patterns. Repeated measures multilevel analysis is the most appropriate way of dealing with this data structure (Goldstein, 2003; Hox, 2002; Twisk, 2006).

In the present study, not every student has exactly five (self-)evaluated lessons. In the traditional multivariate analysis of variance approach to repeated measures, a complete data matrix is required. In case of incomplete datasets, researchers often choose to remove all cases with missing values, with the consequence of valuable information being lost, or they estimate the missing data (Maas & Snijders, 2003). Multilevel modelling however includes the important advantage of being able to handle missing data (Hox, 2002).

Using MLwiN 2.18, several multilevel models were fitted gradually designing the best model. First, an unconditional null model with only a random intercept and no explanatory variables was tested in order to get estimates of how much variation in student teachers' skills regarding the implementation of CL could be attributed to differences between student teachers or between successive lessons. In the next steps, models were tested with the addition of explanatory variables as fixed effects, assuming that their impact does not vary over student teachers or over lessons. The results indicate which variables are of interest and non-significant effects are eliminated considering parsimony of the model.

Model improvement is assessed by studying the decrease in the deviance values over the different models. The restrictive iterative generalised least squares (RIGLS) procedure, which is preferred in small samples (Goldstein, 2003; Maas & Snijders, 2003), was used in estimating unbiased parameters (Goldstein, 2003).

3. Results

3.1 Descriptive results regarding student teachers' skills

In order to answer the first research question, we investigated the changes in student teachers' skills over different measurement occasions. Table 2 provides the descriptive results of the six subscales of the ECLIS.

The rather high mean values reveal that student teachers' perceptions of their skills are relatively positive. However, the quality of CL implementation seems to differ over different lessons. Figure 1 reveals that there is a positive trend, but no linear pattern in the development of the skills. At the moment of the first use of CL as part of this study, student teachers score rather low on the evaluation phase, but they seem to make progress in this consolidation phase at the last measurement occasion. The opposite appears to be the case for socio-affective guiding: student teachers pay extra attention to the emotional aspect and group collaboration from the first to the second lesson, but they seem to fail to maintain this positive trend. Next to these differences between measurement occasions, the quite large standard deviations point at differences in appraisal among the participants.

3.2 Multilevel results

We used multilevel analysis in order to explore the significance of the evolution over the different measurement occasions in student teachers' CL implementation skills, as well as to examine the influence of several predictors.

Table 3 shows an overview of the results of the gradually designed multilevel models regarding student teachers' skills with the overall mean of the ECLIS subscales as the dependent variable in order to obtain a general overview.

The random intercept of 7.11 in the unconditional two-level model (Model 0) represents the overall mean of student teachers' skills across all lessons and all students. It seems that student teachers generally perceive their skills in using CL in the classroom to be relatively good. The analysis also includes the estimation of the total variance of the dependent variable, namely 1.148, which is the sum of the between-student variance (0.672) and the between-lesson variance (0.476). The null model shows that the variance at student level ($\chi^2 = 34.167$, $df = 1$, $p < 0.001$) as well as at lesson level ($\chi^2 = 33.653$, $df = 1$, $p < 0.001$) is significantly different from zero, which provides justification for using further multilevel modelling since skills regarding the implementation of CL vary systematically with student and lesson characteristics. It appears that 58,5 % of the variation in skills can be situated at student level, whereas 41,5 % is attributable to differences between lessons.

Table 2. Student teachers' skills (*n*=372) regarding the implementation of CL (max. 10)

		Intro-duction	Organisa-tional guiding	Socio-affective guiding	(Meta-) cognitive guiding	Realisation of key principles of CL	Evaluation
T1	*M*	7.02	7.19	6.86	6.62	7.26	6.61
	SD	1.30	1.24	1.36	1.54	1.31	1.64
	SE	0.13	0.12	0.14	0.15	0.13	0.16
T2	*M*	7.20	7.37	7.07	6.98	7.43	6.82
	SD	1.32	1.28	1.41	1.47	1.43	1.56
	SE	0.15	0.15	0.16	0.16	0.16	0.19
T3	*M*	7.30	7.52	7.06	6.80	7.48	6.68
	SD	1.38	1.14	1.33	1.36	1.13	1.92
	SE	0.17	0.14	0.16	0.17	0.14	0.25
T4	*M*	7.26	7.27	7.00	6.97	7.27	7.14
	SD	1.28	1.20	1.35	1.40	1.26	1.56
	SE	0.19	0.17	0.19	0.20	0.18	0.24
T5	*M*	7.26	7.27	7.00	6.97	7.27	7.14
	SD	1.28	1.20	1.35	1.40	1.26	1.56
	SE	0.20	0.17	0.19	0.20	0.18	0.24
Overall	*M*	7.19	7.34	6.97	6.84	7.37	6.80
	SD	1.30	1.24	1.33	1.47	1.28	1.67
	SE	0.07	0.07	0.07	0.08	0.07	0.10

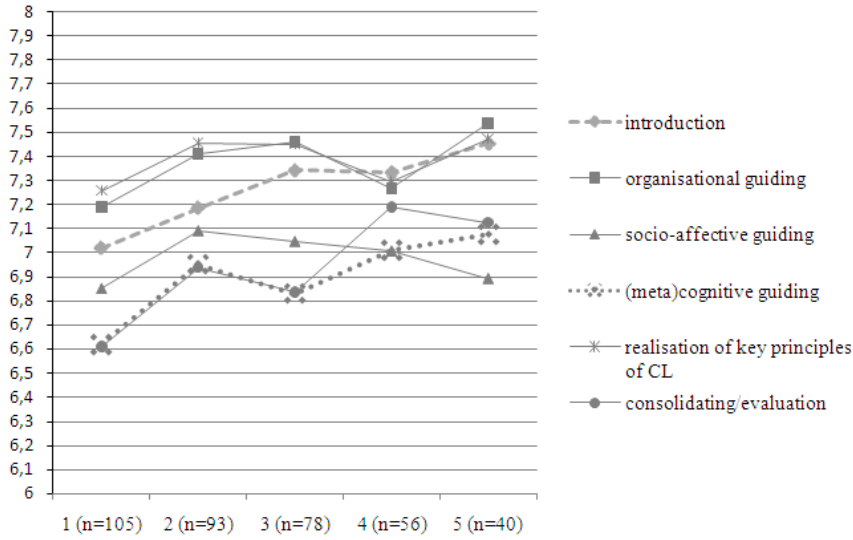

Fig.1. Development of skills regarding the implementation of CL (max. 10) over 5 lessons

In order to gain insight into the development of student teachers' skills over the different measurement occasions, the successive lessons were added to the fixed part of the model (Model 1). Therefore, four dummies were created with the second to fifth lesson contrasted to the first one. This model fits the data better than the null model, for the difference in the deviance is significantly different from zero (χ^2 = 15.052, df = 4, $p < 0.01$). The intercept of Model 1, which is 6.916, represents the overall skill score at the first measurement moment across all students. The fixed slope estimates point at a gradual increase in student teachers' skills over the successive lessons; the difference between the first and the other lessons is statistically significant (respectively χ^2 = 8.249, df = 1, p = 0.004; χ^2 = 9.235, df = 1, p = 0.002; χ^2 = 9.834, df = 1, p = 0.002; χ^2 = 7.945, df = 1, p = 0.005).

In the second model, random variance at student level was allowed for the successive lessons, since it cannot be assumed that the skills of student teachers develop in the same way for all student teachers. The significant decrease in the deviance comparing Model 1 and Model 2 (χ^2 = 38.411, df = 14, $p < 0.001$) provides support for this argument. From the random part of the model, we can conclude that differences between students decrease over the successive measurement occasions.

To explain the variation at both student and lesson level as a function of student teacher and lesson characteristics, explanatory variables were included (Model 3). First, we included six student teacher characteristics separately as fixed effects to the model: gender (reference category: male), general teaching efficacy, self-efficacy regarding the implementation of CL, conceptions about CL, knowledge about CL, and number of workshops attended by the student. This analysis revealed that only general teaching self-efficacy, self-efficacy regarding the implementation of CL, and pedagogical knowledge about CL had a significant explanatory value. Therefore, we included these variables simultaneously into the model (Model 3a) to explain the variation in student teachers' skills in CL implementation. Although the inclusion of these variables accounts for a significant decrease of the deviance (χ^2 = 146.992, df = 3, $p < 0.001$), it was found that only student teachers' general teaching efficacy remains a significant predictor of their CL implementation skills. The influence of pedagogical knowledge and self-efficacy in CL implementation is overshadowed by the impact of general teaching efficacy. Therefore, a more parsimonious model with only this explanatory variable was estimated (Model 3b). In comparison to Model 2, this model still fits the data better (χ^2 = 85.438, df = 1, $p < 0.001$).

Next, two categorical lesson-level explanatory variables were added to the model (Model 3c), namely the lesson subject (reference category: math) and the grade (reference category: grade 1). The deviance of Model 3c is significantly lower than the deviance of Model 3b (χ^2 = 52.722, df = 11, $p < 0.01$), confirming our third hypothesis that classroom variables can affect student teachers' skills. More specifically, it appears that in grade 4 as well as in lessons on religious or moral

Table 3. Model estimates of the multilevel analysis of student teachers' skills regarding the implementation of CL

	Model					
Parameter	0	1	2	3a	3b	3c
FIXED						
Intercept	7.114 (0.089)	6.916 (0.104)	6.917 (0.107)	3.892 (1.130)	3.092 (0.894)	3.629 (0.960)
Lesson 2		0.268 (0.098)	0.268 (0.093)	0.245 (0.097)	0.288 (0.100)	0.325 (0.107)
Lesson 3		0.268 (0.104)	0.272 (0.090)	0.321 (0.097)	0.302 (0.095)	0.376 (0.111)
Lesson 4		0.356 (0.118)	0.364 (0.116)	0.371 (0.122)	0.403 (0.124)	0.498 (.0136)
Lesson 5		0.411 (0.134)	0.435 (0.154)	0.451 (0.173)	0.496 (0.174)	0.489 (0.186)
Time invariant predictors						
Gender				-	-	-
Knowledge about CL				-0.342 (0.183)	-	-
Conceptions about CL				-	-	-
General teaching self-efficacy				0.862 (0.329)	1.089 (0.257)	1.006 (0.274)
Self-efficacy in using CL				0.235 (0.322)	-	-
Number of workshops				-	-	-
Time variant predictors						
Subject of lesson						
Dutch (mother tongue)						-0.264 (0.162)
Social studies and science)						-0.179 (0.137)
Religious/moral education						-0.439 (0.214)
Physical education						0.573 (0.475)
Music/art						-0.058 (0.175)
French (second language)						-0.716 (0.379)
Grade						
Grade 2						0.139 (0.308)

Table 3 continued

Parameter	Introduction	Organisational guiding	Socio-affective guiding	(Meta)cognitive guiding	Realisation of key principles of CL	Consolidation and evaluation
Grade 3						-0.146 (0.212)
Grade 4						-0.500 (0.218)
Grade 5						-0.133 (0.171)
Grade 6						-0.246 (0.171)
RANDOM						
Level 2 - student						
$\sigma^2\mu 0$	0.672 (0.115)	0.687 (0.116)	1.220 (0.168)	1.026 (0.152)	1.067 (0.155)	1.003 (0.148)
$\sigma\mu 0\mu$lesson2			-0.423 (0.111)	-0.337 (0.105)	-0.405 (0.112)	-0.355 (0.107)
$\sigma^2\mu$lesson2			0.823 (0.121)	0.774 (0.122)	0.864 (0.133)	0.819 (0.129)
$\sigma\mu 0\mu$lesson3			-0.400 (0.106)	-0.444 (0.108)	-0.398 (0.107)	-0.400 (0.110)
$\sigma\mu$lesson2μlesson3			0.222 (0.085)	0.281 (0.092)	0.217 (0.092)	0.256 (0.097)
$\sigma^2\mu$lesson3			0.656 (0.105)	0.683 (0.116)	0.685 (0.114)	0.735 (0.127)
$\sigma\mu 0\mu$lesson4			-0.574 (0.140)	-0.505 (0.135)	-0.553 (0.141)	-0.527 (0.144)
$\sigma\mu$lesson2μlesson4			0.334 (0.112)	0.301 (0.114)	0.383 (0.124)	0.395 (0.129)
$\sigma\mu$lesson3μlesson4			0.482 (0.111)	0.538 (0.122)	0.514 (0.122)	0.573 (0.136)
$\sigma^2\mu$lesson4			0.929 (0.169)	0.901 (0.175)	0.983 (0.187)	1.047 (0.205)
$\sigma\mu 0\mu$lesson5			-0.626 (0.181)	-0.457 (0.181)	-0.526 (0.188)	-0.469 (0.188)
$\sigma\mu$lesson2μlesson5			0.516 (0.151)	0.428 (0.160)	0.551 (0.173)	0.572 (0.177)
$\sigma\mu$lesson3μlesson5			0.359 (0.134)	0.438 (0.154)	0.381 (0.153)	0.466 (0.169)
$\sigma\mu$lesson4μlesson5			0.912 (0.195)	0.918 (0.212)	1.015 (0.226)	1.016 (0.239)
$\sigma^2\mu$lesson5			1.385 (0.281)	1.442 (0.316)	1.563 (0.333)	1.538 (0.350)

Table 3 continued

Parameter	Introduction	Organisational guiding	Socio-affective guiding	(Meta)cognitive guiding	Realisation of key principles of CL	Consolidation and evaluation
Level 1 - lesson						
$\sigma^2\varepsilon 0$	0.476 (0.041)	0.455 (0.039)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Deviance	960.286	945.234	906.823	759.831	821.385	768.663
χ^2		15.052	38.411	146.992	85.438	52.722
df		4	14	3	1	11
p		0.005	0.000	0.000	0.000	0.002
Reference model		Model 0	Model 1	Model 2	Model 2	Model 3b

Note. Estimated parameters (with standard errors of estimate in parentheses)

education, student teachers judge their CL skills regarding the implementation of CL significantly less positive. However, it is hard to explain this relationship. Considering parsimony as an important criterion for model quality, next to statistical evidence, we choose Model 3b over Model 3c.

Taking into account the limited sample size, we did not allow random variance at the lesson level. As a consequence, model 3b was found to be the best model for fitting student teachers' skills in the implementation of CL.

The multilevel analyses with all ECLIS subscales taken together (mean) provided an overall picture of student teachers' skills development regarding the implementation of CL. In order to investigate the skills development for each subscale of the ECLIS separately, the same gradually modelling procedure as above was followed. From Table 4, the following conclusions can be drawn:

(a) According to the hypothesis, there is an increase in student teachers' appraisal of their skills between the first and fifth measurement occasion, although this pattern is seldom linear. Further, adding the measurement occasions to the model did not result in a significant improvement of the model fit for the subscales 'socio-affective guiding' and 'realisation of the key principles of CL'.

(b) In line with the overall results, student teacher characteristics appear to influence their skills only to a limited extent. General student teacher self-efficacy is positively related to both the introduction of CL, (meta)cognitive guiding, and evaluation of CL. Further, student teachers with more pedagogical knowledge on the topic of CL appraise their organisational guiding as less positive. With regard to the contextual factors, no clear picture was obtained. The instructions going with CL appear to be more difficult in second language learning (French), whereas the realisation of metacognitive guiding is less appraised in mother tongue lessons (Dutch), social studies and science, and religious education. Further, the fourth grade is negatively related to the introduction of CL, organisational and (meta)cognitive guiding. The clearest finding is that student teachers indicate that the organisational guiding of CL is more difficult to actualise in higher grades. Considering parsimony of the multilevel model, we decided to remove the time variant (contextual) predictors from the models to get the best interpretable model quality.

(c) The random part of the model shows that the variance between students increases significantly for (meta)cognitive guiding and evaluation of CL.

Table 4. Model estimates of the final multilevel model for all subscales of the ECLIS

Parameter	FINAL MODEL					
	Introduction	Organisational guiding	Socio-affective guiding	(Meta)cognitive guiding	Realisation of key principles of CL	Consolidation and evaluation
FIXED						
Intercept	2.941 (0.974)	8.357 (0.494)	6.982 (0.095)	2.571 (1.070)	7.375 (0.096)	1.714 (1.172)
Lesson 2	0.210 (0.131)	0.298 (0.120)		0.394 (0.146)		0.379 (0.174)
Lesson 3	0.422 (0.139)	0.417 (0.128)		0.282 (0.160)		0.279 (0.191)
Lesson 4	0.444 (0.157)	0.265 (0.144)		0.526 (0.209)		0.716 (0.173)
Lesson 5	0.605 (0.179)	0.470 (0.163)		0.497 (0.242)		0.812 (0.278)
Time invariant predictors						
Knowledge about CL	-	-0.535 (0.210)		-		-
General teaching self-efficacy	1.155 (0.280)	-		1.146 (0.307)		1.392 (0.336)
Self-efficacy in using CL	-	-		-		-
RANDOM						
Level 2 - student						
$\sigma^2\mu 0$	0.631 (0.127)	0.790 (0.146)	0.619 (0.130)	2.183 (0.316)	0.678 (0.134)	2.388 (0.346)
$\sigma\mu 0\mu$lesson2				-1.125 (0.245)		-1.646 (0.317)
$\sigma^2\mu$lesson2				1.870 (0.286)		2.680 (0.409)
$\sigma\mu 0\mu$lesson3				-1.429 (0.278)		-1.287 (0.325)
$\sigma\mu$lesson2μlesson3				0.880 (0.241)		1.619 (0.361)
$\sigma^2\mu$lesson3				2.075 (0.338)		2.852 (0.417)
$\sigma\mu 0\mu$lesson4				-1.810 (0.360)		-1.303 (0.299)
$\sigma\mu$lesson2μlesson4				1.654 (0.339)		1.133 (0.310)
$\sigma\mu$lesson3μlesson4				1.732 (0.366)		1.136 (0.327)

Table 4 continued

Parameter	Introduction	Organisational guiding	Socio-affective guiding	(Meta)cognitive guiding	Realisation of key principles of CL	Consolidation and evaluation
$\sigma^2\mu$lesson4				3.134 (0.260)		1.874 (0.359)
$\sigma\mu 0\mu$lesson5				-1.465 (0.388)		-1.843 (0.470)
$\sigma\mu$lesson2μlesson5				1.115 (0.353)		2.037 (0.508)
$\sigma\mu$lesson3μlesson5				1.107 (0.373)		1.977 (0.531)
$\sigma\mu$lesson4μlesson5				2.561 (0.551)		2.169 (0.495)
$\sigma^2\mu$lesson5				3.116 (0.659)		4.225 (0.893)
Level 1 - lesson						
$\sigma^2\varepsilon 0$	0.750 (0.068)	0.594 (0.055)	1.009 (0.087)	0.000 (0.000)	0.893 (0.077)	0.000 (0.000)

Note. Estimated parameters (with standard errors of estimate in parentheses)

4. Discussion

The present study reports on skills development of pre-service student teachers regarding CL implementation during one year of teacher education. Special attention was directed to determining the relationship between student teachers' skills development and both teacher and context characteristics.

In the central hypothesis of this study, we expected student teachers' skills in the implementation of CL to improve over time. This hypothesis was generally confirmed: the lesson appraisal became more positive over successive lessons, although no linear growth was found. For some aspects of student teacher behaviour during CL, a temporary setback was found after the third or fourth lesson. The results of the present study point at the significant influence of general teaching efficacy in the skills development, so we can assume that student teachers with high feelings of teaching efficacy were likely to be more resilient in the face of those setbacks. This confirms the results of Tschannen-Moran and Hoy (2001), who found that student teachers with higher feelings of self-efficacy are more resilient and persistent in putting effort in their professional development process. As a consequence, we can assume that the data of the last measurement occasions in the present study are based on the skills development of the better students, who were more persistent in expending their efforts in the use of CL.

In addition to the overall increase in skills, the random part of the models shows that the variance between student teachers becomes larger for metacognitive guiding as well as for the consolidation phase of CL including reflection and self-evaluation. A possible explanation for this finding is the meta-level character of both aspects of teaching, referring to higher order thinking. Flavell (1987) has pointed at the complexity of this meta-thinking, which provides evidence for larger differences in the skills of students.

As to the second research question, several hypotheses about the influence of student teacher characteristics on their skills development were formulated. In the total model as well as in the separate models for the subscales 'introduction of CL', 'metacognitive guiding', and 'consolidation and evaluation of CL', general teacher self-efficacy seems to be positively related to how student teachers assess their performance. As previously stated, student teachers with higher feelings of self-efficacy are more resilient and persistent in putting effort in their professional development process (Tschannen-Moran & Hoy, 2001). Further, we found a significant negative relationship between the pedagogical knowledge of student teachers with regard to CL and their organisational guiding during a lesson with CL. This may stem from the fact that student teachers who know more about CL may be more critical for their own organisation during the lessons, since they are using higher standards of competence (Townsend & Wilton, 2003).

Surprisingly, no relationship was found between the number of attended training workshops and student teachers' conceptions of CL on their self-reported skills during implementing CL. In this respect, it might be hypothesised that student teachers did not perceive the workshops, given by a researcher, as an integrated part of their curriculum. Further, it is also likely that putting CL into practice is more useful for student teachers, which explains the significant progress over successive lessons. As a consequence, it can be assumed that formative feedback provided by mentors or the reflections of student teachers on their actions influenced their skills development in a substantial way. However, mentors participating in the present study did not receive a specific training in CL, so it can be assumed that some of them were rather unfamiliar with CL implementation. Therefore, further research is needed to investigate the influence of mentor teachers' formative feedback on the student teacher performance and skills development.

The third research question investigated the relationship between contextual variables and student teachers' skills during the implementation of CL. The results, however, do not result in a clear picture. In the current study only grade and lesson subject were taken into account as contextual variables. In future research, additional variables related to the class and school context (e.g. classroom climate, familiarity of mentors with CL,…) should be taken into account as well. We also suggest exploring the culture of the teacher training colleges since we hypothesise that the perception of student teachers regarding training in CL implementation as part of their curriculum might influence their attitudes towards experiencing the use of this instructional strategy.

Against the background of previous studies regarding CL implementation, the present study contributes in different ways to international research. First, the value of the ECLIS for investigating teachers' skills regarding CL implementation can be emphasised since such a measurement instrument did not exist this far. Both (student) teachers and other observers can use this validated, reliable scale. Second, this study focuses on student teachers authentic teaching behaviour, whereas previous studies about CL implementation were predominantly aimed at senior teachers' conceptions. Third, the repeated measurement approach made it possible to discover differences over time in skills development.

Two major implications for teacher education practice appear from our findings. In general, student teachers skills' improve over different measurement occasions, although the number of training sessions attended in teacher education college did not count for significant differences in skills development. As a consequence, we suggest that teacher education colleges aim for an increasing amount of teaching experience regarding CL implementation during the bachelor program (after providing the essential information during lectures), rather than

investing more time in training sessions. Since general teaching efficacy also appeared to be an influential variable, teacher education may also create increasing opportunities for reflection and feedback on student teachers' teaching performance during these practical experiences. In consequence of these reflections and feedback, their pedagogical approach can be adjusted and their self-efficacy as a teacher may grow within a nuanced framework of expectations and performance.

Secondly, a negative relationship between pedagogical knowledge and organisational guiding of CL appeared in our study. As mentioned before, it is possible that student teachers with an extensive pedagogical knowledge regarding CL implementation are more critical for their own organisation of CL, which is often considered as one of the most difficult issues in CL implementation (Gillies & Boyle, 2010). We suggest that teacher education colleges pay more attention to the phase of anticipatory reflection about CL implementation, namely the development of well-considered lesson plans. Future research should analyse lesson plans including CL, making it possible to explore the relationship between lesson preparation and teacher behaviour with regard to the implementation of CL.

Finally, we want to conclude with three limitations of our study. A first limitation concerns the limited sample size. As a consequence, we used principal axis factoring to explore the factor structure of the ECLIS, although we are aware of the merits of multilevel factor analysis for analysing the (nested) factor structure of our repeated measurements data since it allows to explore both the within-individuals factor structure as well as the between-individuals factor structure (Reise, Ventura, Nuechterlein, & Kim, 2005). However, we had to take into account the too limited number of observations per individual to use this analytic procedure. Further, in gradual multilevel modelling, estimates and their factor errors become more accurate with increasing sample sizes at all levels. Maas and Hox (2005) suggests that in a multilevel model with measurement occasions as the lowest level, 5 level-one units are normal; 100 level-two units is appropriate. In this respect, the limited sample size implies a larger risk of bias, in particular with regard to testing variances.

A second limitation is that the findings of the present study were based on self-reports of student teachers. As a consequence, it is possible that they used lower or different standards for the assessment of CL than other stakeholders in education (Tillema, 2009). Although the authenticity of the classroom and practicum context in the current study is a strength for obtaining a valid teacher assessment, Nijveldt (2007) advocates also a combination of various data sources in order to attain an overall judgement of teacher skills taking into account the complexity of teaching. Therefore, it may be worthy to include video registration of CL lessons or to compare the student teachers' self-reports with the perspective of other stakeholders. Video registration makes it possible for teacher educators or experts in the field to

assess student teacher performance from their point of view, making the multiperspective view on student teachers' skills even more valuable. In the present study, we took already some mentor teachers' data into account to validate the ECLIS structure, but it is worthwhile to further investigate the congruence of their lesson appraisal and the student teachers'.

Finally, researchers should go further in the investigation of teacher and contextual characteristics hindering or promoting the implementation of CL. The present study shows only a limited influence of training on student teachers' skills. This appears to be in contrast with previous findings of Veenman et al. (2002), Ishler et al. (1998), and Krol-Pot (2005), who pointed at positive results of training in CL. However, their focus was mainly on the willingness of teachers to implement CL and their self-efficacy, whereas the present study focuses on the skills in itself. As previously stated, further research is needed to validate the findings, with more attention to contextual factors at the pupil, classroom, and school level.

5. Conclusion

Although previous research findings have pointed at teachers' feelings of incompetence with regard to CL implementation (Baines et al., 2003), the current study illustrated a positive skills development as a consequence of persistent use of CL, although no linear pattern was found. Metacognitive guiding during CL as well as the consolidation phase of lessons with CL turned out to generate larger differences between students. General teaching efficacy appeared to be significantly related to the skills development, whereas student's pedagogical knowledge base and attended training activities were not. These findings provide support for curricula in teacher education that requires student teachers to use CL more than once during their teaching practicums, compelling them to persist in the use of CL.

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5 Student teachers' competence in lesson planning pertaining to collaborative learning

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CHAPTER 5
Student teachers' competence in lesson planning pertaining to collaborative learning

Abstract

Taking into account the merits of anticipatory reflection, instructional planning is perceived as an important process in the professionalisation of teachers. When implementing a complex instructional strategy such as collaborative learning (CL), a thorough preparation becomes even more important. The purpose of the present study was to investigate the quality of lesson plans focusing on CL implementation. Based on the literature, a scoring rubric with 17 criteria in 3 domains (instruction, organisation, and evaluation) was developed and applied to analyse 323 lesson plans of second-year pre-service teachers. The results reveal both strengths (e.g. designing appropriate learning tasks, developing adequate learning materials) and weaknesses (e.g. including social objectives, rules, and agreements for collaborative work) in the lesson plans. The rubric proves to be a useful instrument both for research and practice-oriented reflection. The findings provide significant insights for teacher training with regard to CL implementation.

1. Introduction

This study concerns the investigation of pre-service teacher competence pertaining to collaborative learning (CL) implementation through the analysis of lesson plans including the use of this instructional strategy. In the last decades, CL has been increasingly recommended by researchers since a large number of studies have pointed at its effectiveness: CL appears to promote cognitive learning processes (Fawcett & Garton, 2005; Slavin, 1996), social-emotional functioning (Johnson et al., 2001; Marzano et al., 2001), and psychological development (Johnson & Johnson, 1999; Marzano et al., 2001; Slavin, 1996) of pupils in primary schools. However, teachers' pedagogical behaviour is surely crucial to guarantee these promising results (Gillies, 2006; Gillies & Boyle, 2008; Hornby, 2009; Meloth & Deering, 1999). Consequently, this creates a challenge for teacher education, which has the responsibility to familiarise student teachers with the background of CL as an instructional strategy and the actual implementation of it in practice (Cohen et al., 2004; Veenman et al., 2002). This acknowledgement coincides with (a) an increasing number of professional development initiatives organised to improve teaching competences regarding CL, predominantly in in-service teacher education (e.g. Ishler et al., 1998), and (b) the growing attention to the assessment of teaching

competences with regard to CL implementation (e.g. Hornby, 2009; Ruys et al., 2011; Ruys et al., 2012a).

Given the main focus in the literature so far on in-service training, the present study will focus on pre-service teacher education since in this context the foundation for CL implementation should be layed. With regard to the assessment issue, Nijveldt (2007) and Stronge and Tucker (2003) emphasise the significance of combining different sources of assessment in order to acquire a comprehensive and accurate view of teaching competence. Qualitative materials like lesson plans, videotaped lessons, or written reflections can enrich the judgement of teacher competences. To date, however, none of these qualitative materials were already taken into account to analyse teacher competence regarding CL implementation. Therefore, the present study aims to contribute to the plea for taking new sources of assessment into account when investigating teacher competence. We more specifically focus on the analysis of lesson plans to reveal student teachers' competences for several reasons: (a) Tillema (2009) emphasises that the analysis of lesson plans is a suitable approach of gaining insight into teacher competence, (b) instructional planning is in general perceived as an important process in the professionalisation of teachers (Baylor, 2002; Kitsantas & Baylor, 2001; Yildirim, 2003), (c) Gillies and Boyle (2010) recently stressed the importance of instructional planning in the context of CL implementation in particular , and (d) previous studies have provided evidence for the relationship between lesson planning and teaching quality in terms of student achievement and instructional behaviour (e.g. Naafs et al., 2002; Meyen & Greer, 2009).

To achieve the main goal, we first introduce a theoretical framework regarding CL to clarify this central concept. Then, we discuss the importance of anticipatory reflection in teacher education and in CL implementation in particular. In the empirical part of the study, we first elaborate on the development of an adequate instrument for analysing lesson plans containing a collaborative activity. The result section further present insight into the strengths and weaknesses in student teachers' competence pertaining to the preparation of CL implementation.

1.1 Collaborative learning

CL refers to any instructional method in which students work together toward a common goal, emphasising interaction and group processes. Dillenbourg (1999, p.1) argues that CL is '*a situation in which two or more people learn or attempt to learn something together'*. During this collaborative process, learners depend on and are accountable for their own and one another's active learning process (Dillenbourg, 1999). '*The aim is to work towards a shared meaning as a result of the negotiation process and towards a common learning result, a result that also*

serves as the basis for individual understanding, a personal viewpoint and identity' (Van der Linden et al., 2000, p.39).

A large variety of group learning approaches is called 'collaborative learning', although some of these approaches are often called 'cooperative learning' as well. Cooperative learning is based on the systematic application of group learning structures, which involves series of proscribed behaviour where students pursue common goals while being assessed individually (Millis & Cottell, 1998). The most well-known model of cooperative learning is the 'Learning Together' model of Johnson and Johnson, which incorporates five specific tenets, which are positive interdependence, individual accountability, direct interaction, promotion of social skills, and evaluation of the group process (Johnson & Johnson, 1999). Other important cooperative learning models are for example the 'Structural Approach' of Kagan (1994), Sharan's 'Group Investigation' (1994), or the 'Student Team Learning method' of Slavin (1996). All cooperative models have in common a focus on cooperative incentives rather than competition to promote learning. These structures can be applied to almost any subject matter.

Resta and Laferrière argue: *'There is no universally adopted meaning of the terms collaborative and cooperative learning or agreement on precisely what their differences or communalities are. This may result from the fact that educational researchers often have had different purposes, goals, and perspectives, which prohibit a clear distinction between these two approaches'* (2007, p.66).

Some authors distinguish between cooperative and collaborative learning as having distinct historical and philosophical roots (e.g. Bruffee, 1995; Panitz, 1997), or having a different nature of the task structure and level of pre-structuring (e.g. Curtis & Lawson, 2001). Dillenbourg (1999, p.8) defines the difference roughly as follows: *'In cooperation, partners split the work, solve sub-tasks individually and then assemble the partial results into the final output. In collaboration, partners do the work together'*. Other authors, however, state that collaborative learning can be seen as covering all peer collaboration methods, including for example cooperative learning (Meloth & Deering, 1999; Millis & Cottell, 1998). Collaborative learning strategies are less specific and not easy to define (Rose, 2002). In this view, both approaches lie on a continuum, *'with collaborative learning being the least structured and cooperative learning the most structured'* (Millis & Cottell, 1998, p.7; see also Flynn & Klein, 2001). As such, cooperative learning can be regarded as a *'more-structured, hence more-focused, form of collaborative learning'* (Millis & Cottell, 1998, p.4).

In the present study, we opt for the use of 'collaborative learning' (CL) as a broad, more general concept covering multiple peer collaboration approaches, amongst which for example cooperative learning, peer tutoring, discussion groups,

etcetera (Dillenbourg, 1999; Meloth & Deering, 1999; Millis & Cottell, 1998) since this variety fits best the reality of peer collaboration in Flemish primary school classes.

1.2 Anticipating CL implementation during instructional planning

Given the complex nature of CL, professionalisation with regard to the implementation of this instructional strategy is indispensable (Gillies & Boyle, 2010; Ruys et al., 2010). In general, teacher education has often emphasised instructional planning (Baylor, 2002; Kitsantas & Baylor, 2001; Yildirim, 2003) because student teachers can gain experience in thinking through what to teach, how to teach it, and how to evaluate it. They anticipate and solve potential difficulties (Blumenfeld et al., 1996). In the context of CL implementation, the importance of careful lesson preparations is recently emphasised (Gillies & Boyle, 2010), for the implementation of CL *'is not simply placing pupils in groups and telling them to work together'* (Veenman et al., 2000, p.293). Underneath, we respectively discuss the place of instructional planning in teacher education and the importance of instructional planning pertaining to CL implementation in more detail.

Anticipatory reflection in teacher education

Internationally, many researchers have pointed to the importance of reflection as a standard professional disposition of teachers (Freese, 2006; Schön, 1983; Van Manen, 1995). As a consequence, teacher education has moved during the last decades towards developing reflective practitioners (Conway, 2001), i.e. teachers reinterpreting and reframing their experiences from a different perspective in order to make sense of the complexities of teaching. Loughran (1996) distinguishes between reflection during planning (anticipatory reflection), reflection during actual teaching of the lesson (contemporaneous reflection), and reflection after the lesson (retrospective reflection). Reflective activities in teacher education are primarily interpreted in terms of contemporaneous or retrospective reflection (Conway, 2001). In the context of the present study, however, we are particularly interested in the role of reflection-before-action, or prospective or anticipatory reflection (Schön, 1983; Van Manen, 1991). During anticipatory reflection, teachers think about how to prepare for teaching; they organise and prepare content and materials, select instructional strategies, and consider how to tailor instruction to the unique level of the learners (Pinsky & Irby, 1997). Emphasising the potential benefits of a more explicit and expansive focus on prospective reflection, Conway (2001, p.90) states: *'Looking toward the future with knowledge of the past from the viewpoint of the*

present (…), is a particularly salient aspect of novice teachers' everyday experience'.

Anticipatory reflection and instructional planning are in general perceived as the key to successful lessons (Frudden, 2001; Halpern, 2002). The work of several authors provides clear evidence for this statement. Teachers were found to attribute teaching failure (Pinsky, 1997) as well as teaching success (Pinsky et al. 1998) to causes in the planning phase. Dunn and Shriner (1999) also revealed that teachers considered (written and mental) planning activities as more relevant than other activities for improving their teaching effectiveness. Further, Naafs et al. (2002) and Carnahan (in Frudden, 2001) found a positive relationship between elaborate lesson plans and final student achievement, since a thorough preparation seemed to provide more time-on-task for the students and consequently more learning opportunities. In addition, a positive effect of planning was found on the quality of teachers' instructional behaviour (Byra & Coulon, 1994; Meyen & Greer, 2009).

Instructional planning with regard to CL implementation

The most important challenge in preparing lessons including CL is to ensure the presence of the five key principles of CL: positive interdependence, individual accountability, direct interaction, promotion of social skills, and evaluation of the process (Johnson & Johnson, 1999). Although these principles are delineated in the context of 'cooperative learning' research, they are often emphasised within 'collaborative' learning studies as well (Dillenbourg, 1999).

Positive interdependence refers to a situation when one student's success positively influences the chances of group members' successes: students know that they can only succeed when the others of the group succeed. Individual accountability ensures that each group member has responsibility for his own learning as well as for helping other group members to learn. Both aspects can be realised by e.g. integrating roles during the collaborative work or developing an appropriate CL learning task, referring to the assignment the teacher develops for pupils to work on during the collaborative activity (Gillies et al., 2007; Gillies & Boyle, 2010; Jacobs et al., 2002). Third, successful CL requires an environment where students can interact efficiently face-to-face with each other (Johnson & Johnson, 1999). Therefore, the classroom often needs some re-arrangement. Ideally, a teacher thinks this through in advance, in order to shorten the time spent to this re-arrangement, resulting in more time-on-task for pupils (Frudden, 2001; Naafs et al., 2002). In addition, also a deliberate group composition may promote students' interaction (Jacques, 2004). Fourthly, CL not only aims at cognitive performance, but also social skills are explicitly part of the learning process and output. Group processes

are therefore emphasised in the learning objectives. In addition, it is important that teachers discuss strategies for effective collaboration, since the research of Gillies (2000, 2006) revealed that students cannot work efficiently together without explicitly teaching them how to actualise this. Finally, evaluation of the CL activity should not be forgotten in the instructional planning, although teachers can collect a lot of information concerning students' learning processes by guiding the collaborative process. Goal achievement in CL is perceived in terms of subject-matter related as well as social objectives (Johnson and Johnson 1999). Therefore, a lesson plan should ideally discuss how the teacher will evaluate the learning process as well as the learning product (Gillies et al., 2007; Jacobs et al., 2002; Meloth & Deering, 1999). The learning product refers to the outcome/results (cognitive, emotional, or behavioural) of the collaborative process.

In addition to the key principles of CL distinguished by Johnson and Johnson (2009), other important aspects of CL implementation can be taken into account during instructional planning as well: planning the use of time during the lesson, or a clear and complete instruction from the teacher in order to avoid many whole-class interventions to clarify the expectations (Gillies & Boyle, 2010, Jacobs et al., 2002; Johnson et al., 1991). Finally, teachers have to reflect in advance on their own behaviour and role during students' collaborative activities (Delièvre et al., 2006; Gillies et al., 2007).

2. Method

2.1 Aim of the study

Notwithstanding the fact that the effectiveness of CL largely depends on the pedagogical behaviour of the teacher (Gillies & Boyle, 2008) and instructional planning plays an important role in the context of CL implementation (Gillies & Boyle, 2010), so far little attention is paid to teachers' actual anticipatory reflection and lesson plans for the use of CL as an instructional strategy in the classroom. This study more specifically aims to gain insight into the strengths and weaknesses of pre-service teachers' lesson plans with regard to CL implementation. Given the limited attention in the literature for the planning of CL, an adequate instrument for analysing teachers' instructional plans of lessons including CL was not yet available and was therefore developed in the present study.

2.2 Participants

Participants were 100 white, predominantly middle-class, primary school student teachers (86 women and 14 men) from four teacher training colleges in Flanders (Belgium). Student teachers' mean age was 20.5 years. All participating pre-service teachers successfully completed the first year of a three-year bachelor programme for teacher education, including a mandatory training period. During their second year of teacher education, a sample of 323 lesson plans including the preparation of a CL activity was collected.

At the beginning of their second year of teacher education, some background information about the participants was collected (for more details, see Ruys et al., 2011 or Chapter 4 of this dissertation). In general, the student teachers had a moderate feeling of self-efficacy with regard to CL implementation. However, most of them had only limited experience with the use of CL in classroom teaching. During their own school career, about half of the students experienced the use of peer collaboration forms by their secondary school teachers as well as by their teacher educators positively. The participants' beliefs about the value, cost, and expectations of CL for primary school children were generally positive.

2.3 Procedure

Previous research revealed that CL has not yet received a profound place in the curriculum of Flemish teacher education (Ruys et al., 2010; see also Chapter 2 of this dissertation). A previous study regarding the pedagogical knowledge of student teachers about CL (Ruys et al., 2012a or Chapter 3 of this dissertation) with the same participants as the present study, indicated that their knowledge about CL is rather limited and superficial. Therefore, the participants of the present study had the opportunity to attend four two-hour workshops on CL conducted by the first researcher of this study prior to their practicum. The workshops were a formal part of the curriculum. The first workshop was focused on the nature of CL, including theoretical and empirical underpinnings. The following workshops dealt respectively with pre-implementation concerns, points of interest during implementation and closing situations. During the second workshop, student teachers critically discussed examples of lesson plans including CL activities. Besides the training workshops, CL was not further addressed and discussed in the lessons.

Student teachers were required to create lesson plans including CL activities, intended to actually teach these lessons during their practicum in primary schools. The student teachers employed the lesson plan format of their own training college since they were familiar with the use of it. The formats all included the same components such as objectives, timing, materials, procedure, and evaluation. No

further detailed guidelines were provided: students were free to choose the subject of their lesson and the specific type of CL. No further sampling methods were used: all lesson plans that were developed prior to the participants' practicums were included in the study. Table 1 represents the occurrence of different lesson subjects in the lesson plans. As can be seen in Table 1, it is notable that the majority of the pre-service teachers prefer the subject 'Social studies and science' for implementing CL. Based on the findings of a recent interview study (Ruys et al., 2012b; see Chapter 6 of this dissertation), this preference is referred to as due to the 'open' character of this subject. Textbook series for this subject are perceived as less prescribing and the content-related pressure is perceived as less influential, which make teachers more keen to opt for CL as an instructional strategy in 'Social studies and science', rather than in e.g. mathematics or (second) language lessons.

A draft version of the lesson plans was submitted to the mentor teachers in order to receive interim feedback. Afterwards, it was passed to the researchers of this study.

Table 1. Occurrence of different lesson subjects in the lesson plans (n = 323)

Subject	*n*	(%)
Mathematics	27	(8.4 %)
Dutch (mother tongue)	51	(15.8 %)
Social studies and science*	183	(56.7 %)
Religious/moral education	18	(5.6 %)
Physical education	3	(0.9 %)
Music/art	26	(8.0 %)
French (second language)	2	(0.6 %)
Cross-curricular**	13	(4.0 %)

Notes.
* In the Flemish educational system, 'social studies and science' is an interdisciplinary subject integrating six domains: nature, technology, psychology, sociology, history and geography
** In cross-curricular lessons, a teacher combines and/or integrates the content of different subjects. In the context of the present study, pupils predominantly worked collaboratively in corners (each corner was dedicated to a particular subject).

2.4 Instrument: scoring rubric

Given the limited attention in the literature for the planning of CL, an adequate instrument to analyse the quality of lesson plans with CL was not available. However, a few recent studies addressed the assessment of lesson plans of (student) teachers in general by means of a scoring rubric (e.g. Baylor, 2002; Campbell & Evans, 2000; Ozogül et al., 2008; Spooner et al., 2007), valuing its usefulness for rating authentic student work (Jonsson & Svingby, 2007). The present study builds on these experiences by developing a rubric for the analysis and evaluation of lesson plans including CL.

Three phases can be separated in the development and validation process of this rubric. First, based on an in-depth analysis of the literature about CL implementation and the instructional planning phase that goes with it (see Table 2), aspects influencing the efficiency and effectiveness in terms of success/failure of CL implementation were delineated. This framework provided the components of the rubric. The relevance and level of specificity of these components and the structure of the rubric were reviewed for content validity by an expert panel in a second phase, then revised into its final form based on their feedback. Five researchers with expertise in CL and/or teacher training were involved, as well as four teacher educators, one senior primary school teacher, and two primary school student teachers that previously used CL as an instructional method. Based on their feedback, the rubric was revised to its nearly final form. Some adaptations in the formulation of the rubric cells were made. In addition, two initial criteria were removed from the rubric: (a) 'anticipating unexpected events' (e.g. groups finishing early) had an overlap with the criterion 'differentiated instruction' and was therefore removed; (b) 'focus on improvement' dealt with feedback both on product and process, but this was assumed to be part of the product and process evaluation. In the third phase, the final version was used by two researchers for analysing a pilot of 20 lesson plans, discussing their scores and the process of scoring as well. Small adaptations in the formulation of the rubric cells were made in this last phase making them more specific (e.g. with regard to the criterion 'teacher as a guide', we named the aspects of guiding explicitly instead of only including the number of aspects in the rubric cells, see Appendix 1).

The final scoring rubric consists of 17 criteria organised in three domains: (a) instruction, (b) organisation, and (c) assessment (Freiberg, 2002). The complete scoring rubric is included in appendix 1. A description of each criterion is included in table 2. The rubric is based on the presence or absence of criteria and the clearness of the description of each component (Stronge & Tucker, 2003). Each criterion can therefore be rated on a scale from 0 to 4 (0= absent; 1= unsatisfactory; 2= needs improvement; 3= adequate/meets expectations; 4= exceeds expectations).

2.5 Data analysis

All 323 lesson plans were scored according to the developed rubric. Appendix 2 illustrates how the scoring procedure was carried out for a particular (translated) lesson plan.

In order to calculate inter-rater reliability, 89 lesson plans (27,6%) were randomly selected and double coded by the first author and an independent trained researcher using the rubric. Landis and Koch (1977) characterise kappa values lower than 0 as indicating no agreement, 0-.20 as slight, .21-.40 as fair, .41-.60 as

Table 2. Theoretical background of the scoring rubric

Domain	Rubric criterion	Description of the criterion	Theoretical background
Instruction	Positive interdependence	How does the teacher structure positive interdependence in his lesson, i.e. how does he guarantee that students can only succeed when their group member succeed?	Dillenbourg,1999; Jacobs et al., 2002; Johnson & Johnson, 1999; Kagan, 1994; Slavin, 1996
	Individual accountability	How does the teacher structure individual accountability in his lesson, i.e. how does he guarantee that each group member takes the responsibility for his own learning as well as for helping other group members to learn?	Dillenbourg, 1999; Jacobs et al., 2002; Johnson & Johnson, 1999; Kagan, 1994; Slavin, 1996
	Social goals and objectives	Does the teacher strive for social goals and lesson objectives in addition to content-related lesson objectives?	Jacobs et al., 2002;Johnson & Johnson, 1999
	Type of CL	Does the teacher have a clear view on the type of CL he will use in his lesson?	Johnson &Johnson, 1999; Kagan, 1994; Slavin 1996
	Learning task	Does the teacher will use an adequate collaborative learning task that is adjusted to the developmental level of the students and the lesson objectives?	Gillies et al., 2007; Gillies & Boyle 2010; Jacobs et al., 2002; Slavin, 1996
	Materials and resources	Does the teacher will use adequate materials and resources that are compatible with the lesson objectives and the type of CL?	Gillies et al., 2007; Gillies & Boyle, 2010; Jacobs et al., 2002
	Opening instruction	Does the lesson plan contain adequate information for the opening instruction of the teacher?	Ebbens et al., 1997
	Strategies for developing collaborative skills	How will the teacher help the students to collaborate in an effective and efficient way?	Blatchford et al., 2003; Gillies, 2000; Gillies, 2006, Johnson & Johnson, 2003; Slavin, 1996
	Teacher as a guide	How will the teacher guide the collaborative learning process?	Delièvre et al., 2006; Gillies et al., 2007; Reiser & Dick, 1996
	Differentiated instruction	How will the teacher deal with differences between students and/or groups during collaborative learning?	Jacques, 2004; Reiser & Dick, 1996

Table 2 continued

Organisation	Classroom arrangement	How will the teacher arrange the classroom, realising possibilities for direct interaction between the students in their group?	Frudden, 2001; Hertz-Lazarowitz, 2008; Johnson & Johnson, 1999; Kagan, 1994; Naafs et al., 2002
	Rules and agreements	How will the teacher manage the classroom by developing rules and agreements during collaborative work?	Ebbens et al., 1997; Reiser & Dick, 1996
	Timing	Does the teacher describe an adequate timing for the lesson?	Pinsky et al., 1998; Reiser & Dick, 1996
	Group composition	How will the teacher compose groups that promote efficient and effective CL?	Ebbens et al., 1997; Jacobs et al., 2002; Jacques, 2004; Johnson & Johnson, 1999; Lou et al., 1996
Evaluation	Monitoring group processes	How will the teacher observe the approach and progress in individual students and/or groups?	Gillies et al., 2007; Johnson & Johnson, 2003
	Evaluating the learning process	How will the teacher assess the group process?	Johnson & Johnson, 1999; Naafs et al., 2002
	Evaluation the learning product	How will the teachers assess the learning result/product?	Johnson & Johnson, 1999; Reiser & Dick, 1996

moderate, .61-.80 as substantial, and .81-1 as almost perfect agreement. According to these criteria, the overall inter-rater reliability between both coders was good (percentage of exact agreement 90,27% and Cohen's $\kappa = .872$) in the present study, although there were differences between the criteria (percentage of exact agreement between 74,16% (criterion A7) and 97,75% (criterion C1 and C2) while $\kappa_{(A1)} = .852$; $\kappa_{(A2)} = .881$; $\kappa_{(A3)} = .813$; $\kappa_{(A4)} = .749$; $\kappa_{(A5)} = .712$; $\kappa_{(A6)} = .723$; $\kappa_{(A7)} = .632$; $\kappa_{(A8)} = .888$; $\kappa_{(A9)} = .919$; $\kappa_{(A10)} = .876$; $\kappa_{(B1)} = .949$; $\kappa_{(B2)} = .892$; $\kappa_{(B3)} = 0843$; $\kappa_{(B4)} = .888$; $\kappa_{(C1)} = .919$; $\kappa_{(C2)} = .949$; $\kappa_{(C3)} = .816$). The remainder of the lesson plans were then scored by the first author using the rubric.

3. Results

The analysis of all 323 lesson plans by means of the developed scoring rubric resulted in a picture of the quality of the instructional planning in terms of strengths and weaknesses. Table 3 provides an overview of the scoring results for the different criteria included in the rubric. Below we discuss the strengths and weaknesses in the findings more in detail. Criteria were seen as 'strengths' when more than or exact 50% of the lesson plans received a scoring that was at least 'adequate', whereas 'weaknesses' were defined when more than or exact 50% of the lesson plans scored 'unsatisfactory' or 'absent'.

3.1 Strengths in student teachers' lesson plans with CL

The three most striking strengths in student teachers' lesson plans predominantly relate to teaching competences that are not specifically related to a specific instructional strategy. First, their lesson plans include a well-designed learning task (74.3% is at least adequate) in accordance with the lesson objectives and the developmental level of the pupils. Nearly 20% of the learning tasks exceed the expectations because they are very attractive for students. Secondly, they choose or develop adequate materials and resources (90.1% is at least adequate). Third, they pay explicit attention to the (in)formal evaluation of the product of CL (65.9% is at least adequate). They plan to discuss the learning result of the collaboration, mostly at the end of the lesson or collaborative lesson phase. However, pre-service teachers do not always perceive evaluation as an inherent part of their lessons. For example: *'If there is time left, I will organise a whole-class conversation about the collaborative process (…)'* (#18).

In sum, most second-year pre-service teachers appear to be able to produce a good or excellent basis for teaching and learning as they were already trained in

developing adequate learning tasks and materials, as well as in evaluating learning output, during the first year of teacher education.

Table 3. Frequencies of the scoring results for each rubric criterion (n = 323)

	Exceeds expec-tations	Adequate	Needs improve-ment	Unsatis-factory	Absent
Key Components – Positive Interdependence	36 (11.1%)	134 (41.5%)	63 (19.5%)	54 (16.7%)	36 (11.1%)
Key Components – Individual accountability	41 (12.7%)	125 (38.7%)	29 (9.0%)	77 (23.8%)	51 (15.8%)
Social goals and objectives	8 (2.5%)	96 (29.7%)	21 (6.5%)	76 (23.5%)	122 (37.8%)
Type of CL	18 (5.6%)	108 (33.4%)	146 (45.2%)	50 (15.5%)	1 (0.3%)
Learning task	63 (19.5%)	177 (54.8%)	74 (22.9%)	8 (2.5%)	1 (0.3%)
Materials and resources	86 (26.6%)	205 (63.5%)	13 (4.0%)	4 (1.2%)	3 (0.9%)
Opening instruction	25 (7.7%)	105 (32.5%)	102 (31.6%)	81 (25.1%)	10 (3.1%)
Strategies for developing collaboration skills	4 (1.2%)	51 (15.8%)	21 (6.5%)	17 (5.3%)	139 (43.0%)
Teacher as a guide	0 (0.0%)	9 (2.8%)	40 (12.4%)	86 (26.6%)	188 (58.2%)
Differentiated instruction	0 (0.0%)	56 (17.3%)	6 (1.9%)	3 (0.9%)	258 (79.8%)
Classroom arrangement	0 (0.0%)	136 (42.1%)	57 (17.6%)	29 (9.0%)	98 (30.3%)
Rules and agreements	19 (5.9%)	44 (14.6%)	12 (3.7%)	34 (10.5%)	214 (66.2%)
Timing	59 (18.3%)	58 (18.0%)	125 (38.7%)	26 (8.0%)	65 (20.1%)
Group composition	46 (14.2%)	37 (11.5%)	103 (31.9%)	109 (33.7%)	28 (8.7%)
Monitoring group processes	0 (0.0%)	1 (0.3%)	4 (1.2%)	24 (7.4%)	294 (91.0%)
Evaluating process	43 (13.3%)	11 (3.4%)	7 (2.1%)	22 (6.8%)	240 (74.3%)
Evaluating product	62 (19.2%)	151 (46.7%)	45 (13.9%)	26 (8.0%)	39 (12.1%)

Note.
With regard to the rubric criterion 'materials and resources', twelve lesson plans were not scored since no materials or resources were needed in the CL lesson. Three lesson plans were not scored on the criterion 'classroom arrangement' since the lesson took place in the gymnasium.

In addition to these general teaching competences, the analyses of the lesson plans indicate also strengths that are directly concerned with CL implementation. Positive interdependence and individual accountability are generally seen in the literature as the most crucial components for realising CL in an effective way (Johnson & Johnson, 1999). About half of the student teachers in this study describe in their lesson plan at least one specific way of realising and guaranteeing positive interdependence and individual accountability. In most cases, students define roles

for the pupils, or make them dependent on each other by sharing materials and resources. For example: *'Each pupil in the group has his role: a timekeeper, a reporter, or a silence agent. Each pupil in the group gets a different brochure about 'Jeugdboekenweek'* [a yearly thematic campaign about reading juvenile books]. *They have to tell each other about the content of the brochure in order to solve the assignment questions.'* (#160).

3.2 Mixed pattern results: Strength for some students, weakness for others

Some student teachers' lesson plans meet or exceed the expectations for particular criteria, whereas the same criteria are absent or inadequately described in other lesson plans. Therefore, two important issues cannot be seen as obvious strengths or as pure weaknesses with regard to the instructional planning of CL implementation.

First, a great number of pre-service teachers experience difficulties with deciding how to engage students in collaborating efficiently and effectively, whereas others master these processes of instructional decision-making. 39% of the lesson plans achieve at least an adequate score for the quality of the elaboration on the design of the collaborative activity ('type of CL', e.g. peer tutoring, discussion carrousel), but in almost half of the lesson plans some further refinement (45,2%) or crucial adaptations (15,5%) are needed. The introduction of CL to the students is at least adequately described in 40% of the lesson plans, but the other student teachers include only a limited or vague elaboration of the introduction of CL. Although all participating pre-service teachers attempt to include a CL environment, further refinement and elaboration on how CL processes will be organised and introduced to the students is needed in almost half of the lesson plans. In addition, it is notable that 50 lesson plans (15,5%) refer to a specific type of CL when there is no clear added value of this instructional strategy taken into account the intended learning task or the lesson objectives. In the example: *'Look at pages 79 and 80 in your work books. You have to make the exercises 1 to 5. You can work together with three persons.'* (# 33), pupils are allowed to work together but they do not need each other to do the assignment. Finally, it appears that most pre-service teachers pay limited attention in their lesson plans to how they will help students to work together, although many researchers have emphasised the importance of it (e.g. Gillies, 2006). The results of the present study indicate that 43% of the lesson plans contains no reference to strategies the teachers will use in order to develop the collaboration skills of the students, although 17% of the student teachers achieve at least an adequate score for this criterion.

Secondly, the results with regard to organisational aspects of CL implementation show a mixed pattern. At least a quarter to half of the lesson plans achieves an adequate score with regard to classroom arrangement, group

composition, and timing. For example, 42.1% of the lesson plan grasps an adequate (re-)arrangement of the classroom, allowing direct interaction within the separate groups. However, further improvements in anticipatory reflection are needed in one third of the lesson plans, since they contain no reference regarding classroom arrangement at all. Given the often traditional organisation of the classroom in frontal rows, there can be cast doubts on this result. Further, the group composition is not always exhaustively considered: a great number of lesson plans includes only information about the number of groups that will be composed, without any information about criteria underlying the composing process. Finally, the timing in CL can be more efficient. In 36.2% of the lesson plans, student teachers' describe a (more than) adequate time scheme for their lesson, and they express the intention of communicating this to the students. 38.7% of the plans include an adequate timing, but no reference about communicating this to the students is made, implying they receive the code 'needs improvement'. That makes that 28.2% of the lesson plans do not include an (adequate) time scheme for collaborative work. However, during CL students are working more independent from the teacher. As a consequence, they are only able to plan how long they can work on each part of the learning task when an adequate timing of the lesson is clearly communicated to them.

3.3 Weaknesses in student teachers' lesson plans with CL

Four (clusters of) weaknesses emerge from the analysis of the lesson plans.

First, it is striking that pre-service teachers do not explicitly reflect on their own behaviour during the lesson. In 84.8% of the lesson plans, no or only vague references are made to what they will do during the collaborative work of the students. In addition, student teachers only seldom and vaguely (91.0%) define how they will monitor group processes in function of evaluation.

Further, more than one third (37.8%) of pre-service teachers' lesson plans does not include social goals and objectives. As stated before, student teachers also include only few strategies for helping the pupils to work efficiently and effectively together. Combined with the limited attention to social skills in the lesson objectives, improving social skills as one of the key components of CL appears to be insufficiently addressed in the lesson plans. This is reflected in the restricted on-going evaluation of the group processes as well. In 74.3% of the lesson plans, this is not explicitly inserted, whereas the (in)formal evaluation of the product of CL was at least adequate in 65.9% of the cases.

Third, more than half of the pre-service teachers do not explicitly plan rules and agreements for the collaborative work (66.2%), while others think this through at least adequately (20,5%) before the lesson implementation.

Finally, differentiated instruction appears to be nearly absent in the lesson plans with CL, which can be regarded as problematic. Although CL offers many opportunities to anticipate differences between students and between groups, student teachers describe related aspects in one fifth of their lesson plans adequately (17.3%).

4. Discussion

The present study reports on (a) the development of a measurement instrument (scoring rubric) to analyse the quality of lesson plans implementing CL, and (b) the strengths and weaknesses in 323 lesson plans with CL of pre-service teachers. In this discussion section, we will provide different perspectives to interpret the research findings. Implications for teacher education practice and suggestions for future research, taking into account the limitations of the present study, are also addressed for each research question separately.

4.1 Development of a scoring rubric for analysing the quality of lesson plans with CL

In this study, we developed a scoring rubric for analysing the quality of student teachers' lesson plans with CL. This measurement instrument has shown its reliability merits in the analyses due to the fact that the expectations for each score were clearly described. The content validity of the rubric was guaranteed since it was based on the literature about the implementation of CL and since the instrument was presented to and reviewed by an expert panel. We suggest that other types of validity are further unravelled in future research. In view of this validity issue, we want to stress that the analysis of lesson plans by means of the rubric requires these plans to have a reasonable amount of detailedness/elaboration. In brief and very general lesson plans or 'planbook plans' (Jacobs et al., 2008), none of the rubrics' criteria can be observed. Moreover, we believe that elaborating the lesson plans also fosters the learning process of student teachers with regard to instructional planning, as Frudden (2001) suggests that thinking through what to teach, how to teach, and how to assess is the strength of instructional planning for teachers' professional development.

Although the rubric is a suitable instrument for the analysis of lesson plans, it is only a first step in obtaining a comprehensive view of teacher competence. Nijveldt (2007) suggests combining multiple sources of evidence in future studies, since lesson plans do not provide information about for example student teachers' actual performance during implementation. It is possible that student teachers do not

describe some pedagogical choices in their lesson plans (e.g. their own guiding behaviour during pupils' collaborative work), but that they rely on their routines to bring them into practice. In this respect, it is not yet clear whether differences in CL implementation performance can be (partially) attributed to the developed lesson plans. Given the large differences in the quality of the lesson plans, it can be hypothesised that a lesson plan is at least a useful, important start for a successful lesson, although we cannot demonstrate that student teachers with high-quality lesson plans will succeed in more effective and efficient CL implementation than student teachers with poorly developed lesson plans. Further research is therefore necessary to investigate the relationship between lesson plan quality and teaching performance regarding the use of CL. In this respect, also, other factors that might influence this relationship, such as student characteristics, teaching repertoire, context factors et cetera, should be taken into account.

Following Van Velzen and Volman (2009), we also suggest that student teachers discuss their lesson plans extensively with peers, teacher educators, and mentor teachers in order to reveal their implicit pedagogical knowledge. As Conway (2001) states, teacher education favours reflecting on the distant past (the apprenticeship of observation) or the more immediate past (e.g. lesson). However, prospective teachers' imagination in learning to teach and anticipatory reflection are at least even important. In this respect, the scoring rubric can not only be used as an evaluative instrument, but also as a guiding instrument for reflection on strengths and weaknesses with regard to CL implementation. Discussing one's own lesson plans creates opportunities for pre-service teachers to consider the adequateness of the instructional decisions and to think through the link between their lesson plan and classroom practice. Such reflections will be largely in-depth when the 'why' of these decisions is interpreted, since more practical pedagogical knowledge will be made explicit. In this respect, we acknowledge that the current study only provides insights into the product of instructional planning, in this case the written lesson plan including a CL activity. It may be useful to direct further research on this topic to the process of writing these lesson plans, in order to discover underlying pedagogical decisions, obstacles encountered, etc.

In the present study, we only used one source of assessing student teachers' competences, whereas Nijveldt (2007) and Stronge and Tucker (2003) recommended a combination of sources. The research instrument we developed in the present study, however, can be used as an adequate tool in the achievement of that purpose. Therefore, it will be interesting for future research to explore the relationship between lesson plan scores and lesson implementation quality by using

a comparable measurement. In a next phase, it will be useful to explore the impact of discussing the lesson plans in relation to the classroom implementation.

4.2 Strengths and weaknesses in pre-service teachers' lesson plans with CL

The strengths and weaknesses in lesson plans with CL are related to the three rubric domains, namely instruction, organisation, and assessment (Freiberg, 2002).

With regard to *'instruction-related' criteria*, the findings indicate that the basis for effective group work is adequately described in student teachers' lesson plans. As experienced teachers mention the importance of a well-constructed task for CL (Gillies & Boyle, 2010), most participating student teachers succeed in developing such tasks, taking into account the realisation of positive interdependence and individual accountability as the most prominent key components of CL (Johnson & Johnson, 1999).

Further, student teachers score on average rather poorly on *organisational aspects of* CL implementation, such as defining rules, the arrangement of the classroom, group composition, and timing. This confirms the general instructional planning decisions of senior teachers, who do not express these aspects to occur typically in their lesson plans (Young et al., 1998). However, the study of Gillies and Boyle (2010) addresses the grade of instructional challenge of CL, including the management and determination of organisational aspects. Therefore, teacher educators should alert student teachers to the importance of these aspects for the classroom management and the effectiveness of the learning process.

With regard to the *assessment* criteria of the rubric, it became apparent that student teachers focus predominantly on the learning product in CL, mostly at the end of the lesson. Monitoring and evaluating the learning processes is largely absent in the lesson plans. It demonstrates the objectivist perspective of student teachers on evaluation, even when they use instructional strategies that fit better with a constructivist approach on teaching and learning.

Although student teachers in the present study were acquainted with the theoretical and empirical background of CL, it seems that instructing them about the implementation of CL is not sufficient to reach an overall adequate quality of the lesson plans. Based on these findings, suggestions for teacher education can be formulated regarding instructional planning in general and CL in particular.

With regard to curriculum implementation, thorough considerations about the importance of instructional planning are needed. Every teacher has the responsibility to implement the curriculum to meet the officially prescribed attainment targets, although he has some freedom to translate the curriculum into concrete lessons. However, the study of Yildirim (2003) emphasises the dominant influence of course

textbooks: teachers largely tend to deliver the prescribed knowledge and skills in the way that is suggested by textbook series. Coulby (2000, p.19) refers in this respect to teachers as the *'aparatchicks of the textbook curriculum'*. Their behaviour of 'curriculum consumption' leads to deprofessionalisation and deskilling. Consequently, it is important to develop teachers' competence in lesson plans to make them more independent of the course textbooks. Given that the Flemish prescribed attainment targets for primary school children (Flemish Government, 2010) include reference to collaborative skills and attitudes, the competence in lesson planning for CL implementation is even more crucial since course textbooks in Flanders scarcely refer to CL. Since the present study revealed that pre-service teachers predominantly link the use of CL to teaching 'social studies and science', it may be important to develop lesson planning competences pertaining to the use of CL in a wide variation of teaching subjects in order to break through this implicit relationship.

Further, the findings provide new input for the discussion about how student teachers may best learn to plan their lessons, especially with the focus on CL. Traditionally, student teachers have often been asked in teacher education to develop lesson plans following the Tyler model (1950) or the similar model of Reiser and Dick (1996), starting the planning procedure with selecting objectives. Although both models are often criticised being too linear (Blumenfeld et al., 1996; Freiberg, 2002; May, 1986; Yildirim, 2003), they are still dominant in the literature and practice on instructional planning in teacher education (e.g. Lim & Chai, 2008; May, 1986). In the present study, student teachers used a standard format for instructional planning of their teacher education college, in which such a linear model was reflected (cf. Appendix 2). However, based on Bullough (1987, in Young et al., 1998) who states that teachers often start their instructional planning by thinking about the instructional activities they will employ, we asked student teachers to develop a lesson plan with CL, focussing first of all on the instructional strategy rather than on the lesson objectives. The findings illustrate that student teachers succeed generally very well in developing adequate CL tasks. Their lesson objectives and assessment focus were however not consistent with a focus on pupils learning from and to each other. In addition, CL was sometimes used without a clear added value, providing evidence for Klafki's model (2000) in which the importance of a preliminary reflection on the lesson content is stressed in instructional planning before thinking about how to address this content (i.e. choosing methods or instructional strategies). Anyhow, the lack of coordination between the different elements of the lesson plan raises questions about the ideal sequence of student teachers' thinking process in instructional planning. It appears that the student teachers need to have a holistic rather than a linear perspective on instructional

planning in order to fit the different components of a lesson plan into a coherent view. *'It may be that a dialogical model of lesson planning where problem-level processes are emphasised may prove to be a better way forward'* (John, 2006, p.491). Such a dialogical model will help student teachers to better understand the connection between different aspects of the planning process, since the model requires an iterative pattern of exploring and reframing the context of the planning problem in order to the construction of a lesson plan. Future research should go further into this instructional planning discussion.

5. Conclusion

In the present study, a rubric was developed and thereafter used for the analysis of student teachers' lesson plans pertaining to the implementation of CL. The rubric may be also useful as a guiding instrument for reflection in teacher education on strengths and weaknesses with regard to CL implementation. Additional interesting insights and suggestions for teacher education arose from the findings. Student teachers appear to be already fairly competent in developing well-designed learning tasks and adequate materials. Evaluating the product/outcome of CL is also an apparent strength. Weaknesses and mixed pattern results provide interesting input for the design of the teacher education programme related to CL. We more specifically refer to three points of interest. First, more attention is needed for organisational elements during CL implementation? Second, process evaluation needs increased attention given that CL is a pre-eminently instructional strategy to observe, evaluate, and reflect on collaborative processes. Third, student teachers have to be stimulated to implement CL also in subjects different from social studies and science. Further, general issues on instructional planning and curriculum implementation came about in our study. It appears to be challenging for teacher education to come apart from text books and linear instructional planning.

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Appendix 1. Scoring rubric for lesson plans with CL

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
Domain: Instruction						
A-1	Key Components – Positive Interdependence	The teacher clearly describes more than one adequate way of realising and guaranteeing positive interdependence in the lesson plan.	The teacher clearly describes at least one adequate way of realising and guaranteeing positive interdependence in the lesson.	The teacher refers to one or more ways of realising positive interdependence in the lesson, but the elaboration is restricted, incomplete and/or vague.	The lesson plan grasps the realisation of positive interdependence during CL only implicitly or the proposed way of realising positive interdependence is inadequate.	There is no indication in the lesson plan that positive interdependence is pre-structured.
A-2	Key Components – Individual accountability	The teacher clearly describes more than one adequate way of realising and guaranteeing individual accountability in the lesson plan.	The teacher clearly describes at least one adequate way of realising and guaranteeing individual accountability in the lesson.	The teacher refers to one or more ways of realising individual accountability in the lesson, but the elaboration is restricted, incomplete and/or vague.	The lesson plan grasps the realisation of individual accountability during CL only implicitly or the proposed way of realising individual accountability is inadequate.	There is no indication in the lesson plan that individual accountability is pre-structured.
A-3	Social goals and objectives	The teacher strives for clearly defined social goals and objectives, and communicates about this to the students.	The teacher strives for clearly defined social goals and objectives.	The teacher strives for social goals and objectives, but they are formulated vaguely or in general terms.	The teacher sets clearly defined social goals and objectives, but the lesson plan provides little evidence for striving for those objectives.	The teacher sets no social goals and objectives.

Appendix 1 continued

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
A-4	Type of CL	A clear step-by-step description of the type of CL is visually provided to the students.	A clear step-by-step description of the type of CL is included in the lesson plan.	The lesson plan includes an adequate choice of a specific type of CL, but the elaboration in the lesson plan is rather vague or incomplete.	The teacher refers to (a specific type of) CL, but this pedagogical choice is unsuitable/unnecessary for solving the learning task and/or reaching the intended goals and objectives.	There is no clear reference to and/or description of the form/structure of CL that will be used in the lesson.
A-5	Learning task	The teacher clearly describes an adequate CL task that is adjusted to the developmental level of the students and the objectives of the lesson. There are clear indications (e.g. matching student's interests/experiences, eliciting students' activity and involvement) for the attractiveness of the learning task for the students.	The teacher clearly describes an adequate CL task that is adjusted to the developmental level of the students and the objectives of the lesson.	The learning task in the CL environment is adapted to the developmental level of the students and/or the lesson objectives, but adaptations should be made in view of its adequateness for CL.	The learning task in the CL environment is not adapted to the developmental level of the students and/or the lesson objectives.	The lesson plan does not include a clearly defined learning task.

Appendix 1 continued

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
A-6	Materials and resources	The teacher develops adequate materials and resources compatible with the lesson objectives and the structure of CL.	The teacher uses/selects adequate materials and resources compatible with the lesson objectives and the structure of CL.	The teacher uses/selects materials and resources compatible with the lesson objectives and the structure of CL, but adaptations should be made in view of their adequateness for CL.	The teacher uses/selects inappropriate materials and resources to support CL.	Although the lesson plan refers to materials and resources for use during CL, any description, references or appendix is absent.
A-7	Opening instruction	The lesson plan lists all aspects that the teachers plans to address in the opening instruction of CL.	The lesson plan contains adequate information for the opening instruction of the teacher.	The lesson plan refers to some elements of introducing CL to the pupils, but some essential components are lacking.	The lesson plan includes only vague information about the introduction of CL to the students.	In the lesson plan the teacher does not refer to the introduction of the CL process to the pupils.
A-8	Strategies for developing collaboration skills	The lesson plan includes explicit strategies the teacher will use to help the students collaborate in an effective and efficient way. There is clear evidence that the teacher will model and/or visualise these strategies.	The lesson plan includes explicit strategies the teacher will use to help the students collaborate in an effective and efficient way.	The lesson plan includes only vague information about the strategies for students to collaborate in an effective and efficient way.	The teacher refers to strategies for collaborating that are not directly related to the social and/or communicative objectives of this lesson.	The teacher does not mention any strategies to collaborate in an effective and/or efficient way.

Appendix 1 continued

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
A-9	Teacher as a guide	The lesson plan includes information about the teachers' (meta)cognitive, socio-affective, and organisational guiding behaviour during CL.	The teacher describes his own guiding behaviour on minimum 2 of the following aspects: (meta) cognitive guiding, socio-affective guiding, and/or organisational guiding	The teacher describes his own guiding behaviour on one of the following aspects:(meta) cognitive guiding, socio-affective guiding, or organisational guiding	The teacher describes his own behaviour and/or actions during the collaborative process of the students only vaguely and/or restrictedly.	The lesson plan does not contain any references to the pedagogical behaviour of the teacher during the collaborative process.
A-10	Differentiated instruction	The lesson plan includes essential information about how the teacher will adequately deal with differences between students AND groups.	The lesson plan includes essential information about how the teacher will adequately deal with differences between students OR groups.	The lesson plan includes only vague information about anticipating differences between students and/or groups.	The lesson plan includes information about anticipating differences between students and/or groups, but the proposed approach is rather inadequate for the learning process and/or classroom management.	The lesson plan does not include any reference to differentiated instruction.
Domain: Organisation						
B-1	Classroom arrangement	The teacher involves the students in the classroom organisation, keeping guard over adequate learning environment for group work with possibilities to realise the CL key component 'direct interaction'.	The teacher organises the classroom to ensure an adequate learning environment for group work, guaranteeing possibilities to realise the CL key component 'direct interaction'.	The lesson plan includes an adequate classroom arrangement description that guarantees possibilities to realise the CL key component 'direct interaction'. However, there are clear indications that the re-arrangement of the classroom will be rather inefficient (loss of time, not structured,…).	The classroom arrangement described in the lesson plan is unsuitable for collaborative group work.	The lesson plan does not contain any information about the arrangement of the classroom during CL.

Appendix 1 continued

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
B-2	Rules and agreements	The teacher develops adequate, specific, and diverse rules and agreements for collaborative group work by mutual agreement with the students.	The teacher introduces adequate, specific, and diverse rules and agreements for CL.	The lesson plan refers to adequate rules and agreements, but variety and specificity is lacking.	The teacher minimally includes rules and agreements for CL.	The lesson plan does not include any reference to rules and agreements during CL.
B-3	Timing	The step-by-step timing of the CL process is adequate, and is also clearly communicated to the students.	The general timing of the CL process is adequate, and is also clearly communicated to the students.	The teacher describes an adequate timing of the lesson, but does not include references about communicating this timing to the students OR the planned time scheme is inadequate but communicated to the students.	The lesson plan includes a time scheme, which is inadequate for using CL in the proposed way. In addition, the teacher does not include references to communicating the timing to the students.	The lesson plan does not include a clear timing of the lesson with CL.
B-4	Group composition	The teacher describes clearly how groups will be composed and how this composition will be communicated to the students. The lesson plan provides evidence that this group composition promotes efficient and effective collaborative group work.	The teacher describes clearly how groups will be composed. The lesson plan provides evidence that this group composition promotes efficient and effective collaborative group work.	The teacher describes clearly how groups will be composed, but there is no clear indication that this group composition promotes efficient and effective collaborative group work.	The lesson plan includes only vague information about the composition of groups prior to CL.	The lesson plan does not include any reference to group composition prior to CL.

Appendix 1 continued

		Exceeds Expectations 4	Adequate/ Meets Expectations* 3	Needs Improvement 2	Unsatisfactory 1	Absent 0
Domain: Assessment						
C-1	Monitoring group processes	The teacher clearly describes an adequate and systematic way of observing the approach and progress in individual students and/or groups.	The teacher clearly describes an adequate way of observing the approach and progress in individual students and/or groups.	The teacher clearly describes an adequate way of observing the approach and progress in individual students and/or groups, but some adaptations should be made in view of adequateness.	The lesson plan only includes vague references to ways of observing the approach and progress in individual students and/or groups.	The lesson plan does not include references to ways of observing the approach and progress in individual students and/or groups.
C-2	Evaluating process	The lesson plan provides clear indications for informal and/or formal assessment of the group process, in which both the teacher and the students are involved (not only teacher-centred evaluation).	The lesson plan provides clear indications for informal and/or formal assessment of the group process.	The lesson plan provides clear indications for informal and/or formal assessment of the group process after CL, but a systematic approach is lacking.	There are clear indications that the evaluation of the group process will be brief and superficial OR there is no match with the lesson objectives.	The lesson plan does not include any reference to the evaluation of the group process.
C-3	Evaluating product	The lesson plan provides clear indications for informal and/or formal assessment of the learning result/product of each student/group, in which both the teacher and the students are involved (not only teacher-centred evaluation).	The lesson plan provides clear indications for informal and/or formal assessment of the learning result/product of each student/group.	The lesson plan provides clear indications for informal and/or formal assessment of the learning result/product, but a systematic approach is lacking.	The teacher plans to go through the solutions/ results of the learning task without paying much attention to the underlying thinking process OR without a clear match with the lesson objectives.	The lesson plan does not include any reference to the evaluation of the learning result/product of CL.

Note. The performance standard is the expectation for satisfactory performance.

Appendix 2. Example of a (translated) lesson plan (# 310) and coding process

Date: 24/11/2008
Grade: 5th grade (20 pupils)
Subject: Social studies and science
Lesson topic: Health education: first aid
Lesson objectives:
- The pupils can learn something from each other
- The pupils can communicate clearly
- The pupils have respect for each other and for what they do
- The pupils help each other when needed
- The pupils can tell what EHBO (Eerste Hulp Bij Ongevallen – first aid) means
- The pupils can explain concisely which materials are in a first aid box
- The pupils can indicate which number they have to call in case of emergency (100, 101, 112)
- The pupils can explain concisely what they have to do in case of blisters, a bloody nose, a bump, an insect bite, a burn, a graze, an incised wound, a splinter, poisoning, an object in the throat/ear/nose, or a smut in the eye

A_6: The student teacher developed adequate materials compatible with the lesson objectives and the type of CL (score 4)

A_3: Social goals meet the expectations, but the lesson plan does not contains information about communicating the goals to the pupils (score 3)

Appendix: Reading texts
Pictures

B_1: The classroom is efficiently re-arranged in advance (score 3)

Timing	Learning content	Method	Materials
10 min.	Orientation phase 4 groups: - the red group - the blue group - the yellow group - the green group Task cards (rules): - Secretary (writes down the answers of the group) - Task captain (ensures that the group work runs smoothly) - Silence captain (ensures that the group work quitely) - Material manager (ensures that all materials are present) - Supporter (encourages the whole group to work) Brainstorm about first aid: - at first individually - in group - classical	Before the lesson (during the physical education lesson): reorganisation of the classroom. 4 groups of 4 tables; 5 chairs in each group. Orientation phase The teacher lets the pupils choose where they want to sit in the classroom when they come in. When this does not go smoothly, the teacher warns that she will compose the groups. When this warning does not help, the teacher composes the groups herself. There are four groups. The groups are spread over the classroom. In the middle of the group table, there is a big white paper. On this white paper is a coloured paper. This way, the teacher can name the groups by colour. There is a red, blue, yellow, and green group. The teacher tells that every group will immediately get an envelope with different task cards. Every pupil in the group gets a card. The teacher explains the cards concisely. The teacher tells that the present lesson is about first aid. "We will look at what you already know about first aid." The teacher asks the pupils to take a different coloured pencil each. The teacher can see what the contribution is of every pupil. They can write what they know on the white paper. Afterwards, they consider what they know and think about first aid. The most important points are written down on the coloured paper by the secretary. Afterwards, the teacher organises a big classical brainstorm. The different groups round up.	4 white papers (A2 format) 4 coloured papers (A4 format) - red - blue - yellow - green Task cards: - secretary - task captain - silence captain - material mananger - supporter Chalk
15 min.	Learning phase 4 show-boxes: - sterile - disinfectant - oxygen water - sticking plaster - pair of scissors - bandages of different width - adhesive crams - compress 2 envelopes per group: - name cards - description	The material managers can come to the teacher to get a show-box. In this show-box are different first aid materials. The pupils can look in the box for a short time. Afterwards, the material manager can come to the teacher to get 2 envelopes for his group. The first envelope contains name cards for all materials in the show-box. The second envelope contains descriptions. The pupils have to decide which card belongs to which material and put the cards at the right place. Afterwards, the teacher runs through the names and descriptions.	4 show-boxes with first aid materials 4 x 2 envelopes: - name cards - descriptions
25 min.	Processing phase Five different texts: - blisters and bloody nose ✠ ✩ blue group - bump and insect bite ✠ green group - burn, graze, and incised wound ✠ yellow group - splinter, poisoning, sprain ✠ red group - object in the throat/ear/nose and a smut in the eye ✠ blue group (at the back of the classroom)	The pupils get four different texts in their group. Each pupil reads one text and fills in a small form with questions. After 5 minutes, the teacher asks the pupils with the same text to sit together. The pupils with the text ' blisters and bloody nose' replace themselves to the table of the blu group, etc. This division is visualised on the chalk board. The pupils discuss in their group what is most important in their text. They try to explain the content to each other without looking at their text. They have 10 minutes for this. Afterwards, the pupils return to their original group. "You get 10 minutes to explain the different terms to each other." The teacher explains to the pupils that it is important to tell the right content because the group members did not read his text. Every pupils is therefore accountable for his group members to understand the terms from his text. The teacher clearly states the timing for this phase of the collaborative work.	4 x 5 texts Forms Orange paper
5 min.	Evaluation phase Pictures: - bloody nose - graze - burn - insect bite - angry eye	(this phase is planned after the lunch break) The teacher hangs different pictures related to first aid on the chalk board. She asks soms questions: - What do you see on the pictures? - Who did already suffered from one of these injuries? - What do you have to do in such a case? …	Pictures Magnets

A_1: Positive interdependence is structured during JIGSAW (pupils read only own text and need their group members to get access to the other information) and by using roles (taks cards) (score 4)

B_2: There is no clear indication that this group composition (free choice of students) will promote efficient and effective collaborative work (score 2)

A_7: Adequate information about the opening instruction of this teacher is included in this lesson plan (score 3)

A_8: The lesson plan includes explicit strategies (i.e. roles) that the teacher will use to help students collaborate in an efficient and effective way. The use of task cards will visualise the own role for the students (score 4)

A_2: Students are individual accountable during JIGSAW (they have to read their own text) and during the brainstorm (using different colours makes them accountable (score 4)

A_{10}: The lesson plan does not include any reference to differentiated instruction (score 0)

B_2: The lesson plan does not include any reference to rules and agreements during CL (score 0)

A_5: The learning task is clearly described and appears to be adjusted to the lesson objectives and developmental levels of the students (score 3)

A_4: The JIGSAW structure is clearly described in the lesson plan and will be visualised on the chalk board (score 4)

B_3: The general timing of the CL process is adequate, and is planned to be communicated to the students (score 3)

C_1: The lesson plan does not include any reference to ways of observing the approach and progress in individual student and/or group(score 0)

A_9: The lesson plan does not include any reference to the pedagogical behaviour of the teacher during the collaborative process (score 0)

C_3: The lesson plan provides clear indications for the assessment of the learning result, but a systematic approach is lacking (score 2)

C_2: The lesson plan does not include any reference to the evaluation of the group process (score 0)

6 Success and failure in collaborative learning implementation: Student and novice teachers' stories

This chapter is based on:

Ruys, I., Van Keer, H., & Aelterman, A. (2012). Success and failure in collaborative learning implementation: Student and novice teachers' stories. *Manuscript submitted for publication.*

CHAPTER 6
Success and failure in collaborative learning implementation: Student and novice teachers' stories

Abstract

Fifteen student teachers were interviewed in-depth about their experiences with the use of collaborative learning (CL) at the moment of graduation in teacher education. Ten of them were interviewed again after one year in the teaching profession. It was found that student and novice teachers' motives for using CL depend on perceived opportunities and constraints to explore the use of CL, feelings of being inspired and supported, and pupils' characteristics. Success and failure in CL implementation is largely attributed to the preparation of a particular lesson, rather than to issues related to the pupils, teacher, or classroom context.

1. Introduction

Collaborative learning (CL) is an instructional strategy in which two or more learners work together towards a common learning result. In this collaborative process, they depend on and are accountable for their own and their teammates' active learning (Dillenbourg, 1999).

During the last decades, there has been growing interest in the study of CL. A first wave of research focused on the effectiveness of this instructional strategy for pupils' learning. Findings reveal that CL promotes cognitive learning processes (e.g. Slavin, 1996), social-emotional functioning (e.g. Johnson et al., 2001; Marzano et al., 2001; Tolmie et al., 2010), and psychological development (e.g. Johnson & Johnson, 1999; Marzano et al., 2001).

A second, more recent, wave of studies is particularly interested in the role of the teacher in CL implementation (e.g. Abrami et al., 2004; Gillies & Boyle, 2008; Meloth & Deering, 1999). Most of these studies, however, concern senior teachers that are trained to use CL as an innovation in their traditional instructional strategies' repertoire (e.g. Gillies, 2004; Ishler et al., 1998; Krol et al., 2008). Although these studies make a valuable contribution to contemporary practice, it remains important to familiarise and train new generations of teachers in implementing CL in order to break the circle of traditional teaching (Lunenberg & Korthagen, 2005).

Pre-service and beginning teachers' competency development and teaching experiences are, however, far less studied in relation to CL implementation. To address this gap in the literature, the present study has a two-fold research aim. First, we aim to investigate the perspective of student and novice teachers with regard to CL implementation. Veenman et al. (2002) previously examined CL implementation of pre-service teachers, but the results provide only insight into short-term training effects on perceptions and intended teacher behaviour. Therefore, the present study intends to identify motives of teachers to implement CL in practice, following student teachers from graduation through their first year in the profession. Secondly, we comply with Siegel's (2005a,b) plea for more research about teachers' experiences with CL in their authentic teaching context, considering factors that influence the successful implementation without researcher support. In this respect, Gillies and Boyle (2010) already studied the perspective of senior expert teachers on what works in CL and on difficulties they experience. Subsequently, we focus on factors influencing success and failure in CL in real-classrooms from the perspective and experiences of student and novice teachers. As most prior studies on CL adopted a quantitative research approach, we further contribute to the understanding of CL implementation by opting for an in-depth multiple case-studies design.

2. Theoretical framework

Following Dillenbourg (1999) and Meloth and Deering (1999), we use the term 'collaborative learning' in the present study as a broad concept covering multiple approaches on peer collaboration (e.g. cooperative learning, peer tutoring, discussion groups). As to the theoretical framework, we have to rely highly on studies regarding the implementation of 'cooperative' learning methods since the literature has predominantly concentrated on this structured approach of peer collaboration. However, we use the term collaborative learning throughout the text in line with the abovementioned definition.

2.1 The challenge of implementing collaborative learning

As stated above, many previous studies concentrate on CL implementation as an educational innovation within a predominantly traditional teaching repertoire. In this respect, it is not surprising that introducing CL appears to go not as smoothly as intended by researchers. Gillies (2003) found that only few primary teachers actually employed recognised forms of CL, although all reported daily use of peer collaboration in their lessons. Further, Baines et al. (2003) found that children rarely

collaborate despite being seated in small groups. Underneath, we discuss factors influencing the use of CL more extensively.

Factors influencing CL implementation in teaching practice

Several authors addressed general factors influencing the degree to which teachers implement educational innovations. Findings point at the positive relation between teachers' use or willingness to use innovative approaches and teacher skills (Lopata et al., 2003), the degree to which the innovation is aligned with teachers' present practice, and the degree the innovative approach is perceived important (Ghaith & Yaghi, 1997). Teachers with higher feelings of self-efficacy also tend to be more willing to implement innovations (Ghaith & Yaghi, 1997; Meirink, Meijer, & Verloop, 2007; Plourde, 2002; Shachar & Shmuelevitz 1997). Further, Ghaith and Yaith (1997) found that accumulated teaching experience and teachers' estimates of the needed extra time and effort to implement the innovation corrodes their enthusiasm for adopting instructional innovations. The apprenticeship of observation (Lortie, 1975) also influences changes in instructional strategies: teachers tend to replicate the pedagogical behaviour they experienced being a student.

As previous studies indicated that CL as an educational innovation is not yet commonly used in practice (Lopata et al., 2003; Veenman et al., 2002), factors influencing CL implementation and integration are relevant in the context of the present study. Teachers' background variables, like age, gender, or ethnicity, are not significantly related to the degree of CL implementation (Ishler et al., 1998). Conversely, teacher beliefs, teacher training, and teachers' working environment appear to be associated with the use of CL.

First, teachers with positive beliefs about CL are more likely to use CL in their teaching practice. Their expectations of the success, value, and costs associated with the implementation are found to explain more than 40% of the variance in the degree to which teachers incorporate CL in their classroom practice (Abrami et al., 2004). Although Veenman et al. (2002) and Gillies and Boyle (2010) found that CL is generally perceived as worthwhile, research indicates that teachers often stress the perceived cost of CL. Practical constraints, like the availability of material or class size, influence the implementation of CL negatively (Abrami et al., 2004). In addition, developing effective group tasks (Baines et al., 2003; Blatchford et al., 2003; Gillies, 2006), changing the organisation of the classroom (Gillies, 2006; Hertz-Lazarowitz, 2008), and preparing pupils to work together (Blatchford et al., 2003; Gillies & Boyle, 2010; Webb et al., 2006) are perceived as complex, challenging and time-consuming aspects of implementing CL. Teachers also fear loss of control, loss of content coverage, and unequal contributions of pupils

(Veenman et al., 2002), which might lead to a decreased use of CL. Therefore, it is important to improve teachers' beliefs about CL by ensuring positive experiences with the strategy in order to make them self-confident in successful CL implementation (Abrami et al., 2004).

Secondly, many teachers are rather unfamiliar with what CL involves (Krol et al., 2008) or with its potential pedagogical value (Blatchford et al., 2003), and they do not sufficiently understand how to implement CL effectively (Gillies & Boyle, 2010; Johnson & Johnson, 2003). Therefore, Veenman et al. (2002) and Lopata et al. (2003) argue for integrating CL in teacher training, since their studies indicated that teachers are more willing to implement CL after an explicit training course. Training courses are found to improve both teacher skills regarding CL implementation (Ruys et al., 2011) as well as self-efficacy in the use of CL (Abrami et al., 2004; Shachar & Shmuelevitz, 1997; Veenman et al., 2002). Sharan (2010), however, is critical about the long-term influence of CL training on the use in practice: *'Once the formal training programme ends, CL is often abandoned, or at best, practice is significantly reduced'* (p.303).

Teachers' working environment appears to be a contextual factor strongly influencing the degree of CL implementation. Being a member of a collegial teaching team is a significant predictor of long-term CL implementation (Abrami et al., 2004; Ishler et al., 1998; Shachar & Shmuelevitz, 1997). Collegial support and facilitation encourages teachers to use CL or improves their use of CL (Abrami et al., 2004; Ishler et al., 1998; Krol et al., 2008; Veenman et al., 2000).

Success or failure in collaborative learning implementation

'CL's celebrity status may be one of the reasons why teachers rush into it' (p.305), expecting instant success (Sharan, 2010). Yet, it is far more complicated than believed at first to translate the promise of CL into practice. Several factors influence success or failure of CL implementation.

Generally, success and failure in teaching are perceived as even important by teachers. They consider teaching success as an impetus to improvement, whereas failing is regarded as a motivator for change (Pinsky et al., 1998). Pinsky and Irby (1997) and Pinsky et al. (1998) investigated teachers' explanations of why lessons succeed or fail. Most comments relate to the planning phase of teaching (e.g. the preparation of adequate and limited content). Regarding successful CL implementation more specifically, research mainly focused on essential components of cooperative learning on the one hand, and on pupils' and teachers' interaction on the other hand.

First, the initial American research on cooperative learning identified key components for effective CL implementation. Most cited and well-known are

Johnson and Johnson (1999), who linked five key components to the effectiveness of CL: (1) positive interdependence, which refers to linking group members so that they cannot succeed unless the others of the group succeed; (2) individual accountability, ensuring that each group member has responsibilities for his own as well as for his group members' learning process; (3) opportunities for direct interaction; (4) special attention to social skills; and (5) evaluation of the teamwork process. Gillies (2006), Hornby (2009), and Veenman et al. (2002) confirm the importance of teachers' understanding of these components. Studies, however, revealed that teachers often fail to realise these components, although most of these teachers report using CL frequently in practice (Antil et al., 1998; Veenman et al., 2000). Siegel (2005a) explains this finding by referring to the fact that teachers modify research-based CL methods in teaching practice: teachers assume to implement CL, but the eventual enactment of CL may be inconsistent with processes underlying effective CL. Sharan (2010) adds that the rich variety of methods and models could become a constraint to successful implementation as well. The variety may be a source of confusion, leading to a lack of understanding of the differences between approaches.

Second, numerous recent studies emphasise the important role of the teacher in preparing pupils for collaborative work. Research largely focuses on fostering the quality of pupils' discussions and helping behaviour during group activities (Dolmans et al., 2003; Gillies & Boyle, 2010; Meloth & Deering, 1999; Schmitz & Winskel, 2008; Webb, 2009). Training teachers in guiding the enrichment of problem-solving interactions of their pupils (Gillies, 2004), as well as training pupils in communication and helping behaviour (Gillies & Ashman, 1996; Prichard et al., 2006; Terwel et al., 2001) leads to higher learning gains (Dekker & Elshout-Mohr, 2004; Gillies & Ashman, 1996; Oortwijn et al., 2008; Webb et al., 2006). However, Dolmans et al., (2003), Gillies (2003) and Meloth and Deering (1999) warn of difficulties for teachers to train their pupils in high quality helping behaviour because of the high task load of CL in general.

3. Method

Building on the theoretical framework, two central research questions are put forward:

(a) What are student and novice teachers' motives for implementing CL?
(b) Which factors determine success and failure in CL implementation of student and novice teachers?

A qualitative case studies design (Miles & Huberman, 1994) was opted for. In-depth interviews give access to particular experiences of each teacher, and to the processes of interpretation and meaning-making that go with those experiences.

3.1 Participants

Participants were selected from the sample of a series of previous, quantitative studies focusing on competency development of student teachers regarding CL implementation in primary schools (Ruys et al., 2011; Ruys et al., 2012a). During the academic year 2008-2009, 121 second-year student teachers participated in four 2-hour workshops concerning the theoretical background of CL and CL implementation. In addition, they were required to apply CL in their practicum periods during second-year teacher education. One year later (2009-2010), 116 student teachers of this sample entered third (and last) year of teacher education. From this last group, the cases for the present study were selected.

Table 1. Overview of the cases

Case	Name	Year of birth	Gender	CL self-efficacy	CL Beliefs			Interview	
					Expec-tations	Value	Cost	I	II
1	Julie	1989	female	- -	-	- -	+ +	✓	✓
2	Hannah	1989	female	- -	- -	- -	+ +	✓	✓
3	Kiara	1986	female	+ +	+ +	+ +	-	✓	✓
4	Samuel	1987	male	-	+ +	+ +	-	✓	✓
5	Sophie	1989	female	+ +	+	+ +	- -	✓	
6	Silke	1989	female	+ +	+ +	+	- -	✓	
7	Caroline	1989	female	- -	+ +	+	+ +	✓	
8	Emma	1989	female	- -	-	- -	+ +	✓	✓
9	Kelly	1988	female	- -	-	-	-	✓	
10	Nele	1989	female	-	- -	+	+ +	✓	✓
11	Kevin	1988	male	-	+ +	+	- -	✓	✓
12	Sander	1988	male	-	+	- -	- -	✓	✓
13	Lynn	1989	female	+	-	- -	+ +	✓	✓
14	Vanessa	1989	female	+ +	+	+	+ +	✓	
15	Emily	1988	female	+ +	-	+	+ +	✓	✓

We opted for a ‘theoretical sampling’ method (Strauss & Corbin, 1998), making our choice of cases purposefully on conceptual grounds. Given the focus on CL implementation experiences, we selected 15 student teachers using two sampling dimensions or parameters: (1) self-efficacy regarding the use of CL (Ruys et al., 2011), and (2) beliefs regarding CL (Abrami et al., 2004), since teachers’ self-efficacy and beliefs strongly influence the implementation of educational innovations in practice. We measured both parameters in February 2010 in the complete group of 116 third-year students. Based on the survey results, we selected

five student teachers that scored respectively significantly higher (++) or lower (- -) than the average self-efficacy scores, and five student teachers that scored around the mean (+ or -). Nested within the sampling structure for self-efficacy, we selected student teachers with different beliefs: both student teachers with rather positively oriented beliefs (high expectations regarding the effectiveness of CL, highly valuing pupil collaboration, assessing the cost going with CL as rather low), as well as negatively oriented beliefs, or mixed results were included.

Further, we took into account the representative gender proportion in Flemish teacher education for primary schools (about 17% male student teachers). Table 1 provides an overview of the cases. During teacher education, each participant had practicums in all grades of primary school.

3.2 Procedure

Interview I

Participants were interviewed individually and in-depth in June 2010, one week before graduation (interview I). A semi-structured interview guideline was developed based on the theoretical framework. It included open questions about seven topics: (a) general educational beliefs and beliefs regarding CL; (b) beliefs about the teachers' role in CL implementation; (c) apprenticeship of observation (Lortie, 1975) regarding CL; (d) expectations and appreciation regarding training in CL implementation; (e) success and failure in CL implementation: experiences and influential factors; (f) self-efficacy regarding CL implementation; and (g) intentions for future use of CL.

In order to get more clarifications or illustrations, the researcher was allowed to continue asking questions (Lindlof & Taylor, 2002). The flexible use of the interview questions accounted for small differences in the duration (approximately one hour) of the interviews.

Interview II

After at least half a year of experience in the teaching profession, ten participants were interviewed for a second time in April 2011 (Interview II). Five participants of interview I were excluded from interview II for various reasons. Two did not enter the teaching profession, and two declined to participate due to time pressure in their job. Contact information of one participant altered, therefore this person could not be reached.

For the second interview, the guideline was slightly adapted to the changed professional situation of the novice teachers. Questions about the apprenticeship of

observation regarding CL were substituted by detailed questions about the school context and their perception of the teaching profession. The interview duration was between 60-90 minutes.

3.3 Data analysis

Interviews were audio-taped and transcribed verbatim. All interviews were coded in NVivo 9, following the *middle order approach* (Dey, 1993), allowing for further refinements of previously defined broad coding categories of experiences and elements influencing the extent of, and success and failure in CL implementation: (a) teacher characteristics, (b) pupil characteristics, (c) classroom context, (d) school context. Each coded fragment was assigned a code referring to interview I or II in order to identify shifts in experiences and interpretations.

A vertical or within case analysis (Miles & Huberman, 1994) was applied first. A specific synthesis report (portrait) was created that presents the interpretative data using the same structure for every case. Secondly, the results of the within case analysis were submitted to a horizontal or cross-case analysis (Miles & Huberman, 1994), using the method of *constant comparative analysis* (Strauss & Corbin, 1998) in order to identify similarities or differences, and to capture recurring patterns within the data.

Five interviews were independently coded by two researchers. Inter-coder reliability as the level of agreement among both researchers was examined; percent agreement was .86 (Krippendorf, 2004; Neuendorf, 2002).

4. Findings

4.1 Exemplary cases of CL implementation (vertical analysis)

In the within case analysis, we only took into account the stories of teachers that were interviewed twice. We used the frequency of CL use in their first year in the teaching profession and the success or failure they experienced during CL implementation as parameters to explore each particular story.

We identified three different patterns in novice teachers' CL implementation. First, four novice teachers (Emily, *Emma*, Kevin, Lynn) use CL frequently in their teaching practice, in line with their intentions at graduation. They feel comfortable about it since they experience mostly success. Second, three novice teachers use CL regularly, but experience(d) doubts and difficulties in doing this (Julie, Samuel, *Nele*). Consequently, success and failure in CL implementation alternate. Third, three novice teachers (Kiara, Hannah, *Sander*) do not or only rarely use CL, despite

their original intentions at graduation. The parameter of success or failure in CL use is therefore absent in their story.

We describe an exemplary case of one novice teacher per pattern, illustrating that the shift from teacher education to the teaching profession can be a challenging phase as to the implementation of innovative instructional strategies such as CL. However, the portraits also illustrate that it does not necessarily have to be problematic.

Pattern 1: Emma's story

Making a difference in pupils' life, that is Emma's device as a teacher. Obviously, she wants to impart knowledge to her pupils, preferably in an interactive and goal-oriented way. In addition, she attaches great importance to her role as an educator in relation to pupils at risk due to their socio-economic background. During her first year in teacher education, Emma predominantly taught lessons as prescribed in the teaching manuals of textbook series. Based on her experiences with CL in the second year practicum periods, she started integrating this instructional strategy more frequently, although she considered it quite a step to try new instructional strategies. Fortunately, her mentor teachers encouraged here and appreciated the use of CL during her practicum. After adapting her approach by differentiating more between pupils and groups during CL and by taking more time for the introduction phase of CL, she experienced a lot of success and increased the frequency of CL use. Since her pupils became more used to working in groups, Emma experienced even more success than before. Just before graduation Emma stated: *"I think that the use of CL gives an added value to your lessons"*, so she plans to continue and improve her use of CL.

Emma enters the profession by combining two part-time jobs in different schools. After a few months, she gets the opportunity to teach full-time in one of these schools: four days a week in fourth grade, and one day in second grade. She uses CL often and is motivated to use it even more frequently.

> *"This school has a great interest in CL … The principal and my colleagues expressly pay attention to peer collaboration in the classes. The use of CL is discussed and experiences are exchanged. It makes you use CL more deliberately."*

The school population consists of many non-native speakers, making teachers attentive to the importance of communication and interaction in Dutch between the pupils. In this respect, they decide to invest in the increased use of CL. Since textbook series provide little inspiration, teachers have to be creative. Therefore, Emma and her colleagues read books and search on the internet for suggestions.

Regularly, teachers observe lessons from colleagues to gain inspiration and to give mutual feedback. Emma's colleagues soon discover her background about CL from teacher education, which makes her an 'expert' in her school on this topic. Nevertheless, Emma notices that her own approach to the implementation of CL is still improving. Getting to know her pupils better to compose groups largely influences the success of this instructional strategy. Although she feels confident about CL use, experimenting with new forms of peer collaboration makes her doubt about possible failure. A thorough preparation and retrospective reflection are important to Emma.

> *"I always try to prepare as good as possible, but unexpected things can always happen. When I use CL the next time, I try to take this experience into account and search for solutions."*

She hopes that the pupils she will teach next year will be used to CL already, which will make the implementation of this instructional strategy more easy and successful.

Pattern 2: Nele's story

Nele valued the CL training in her second year of teacher education very much. She continued using CL in her practicum periods in the last year of teacher education, but experienced difficulties in using CL in groups where pupils are not used to working collaboratively. After graduation, Nele starts teaching part-time in October in second grade for three weeks. During this period she does not use CL.

> *"I was filling in while a teacher was ill. I simply had to do what was planned, I could not go my own way. However, it wasn't a real deficiency in that short period of time."*

Thereafter, she works full-time in fourth grade in the same school. The very diverse group of 24 pupils requires her to focus on classroom management and getting the group under control during the first weeks. She gradually varies her instructional strategies, implementing CL occasionally. However, her pupils are not used to have some autonomy in their own learning process and her classroom turns out to be too small to compose groups. In addition, Nele notices that the pupils are lacking underlying skills for efficient and effective CL (e.g. communication skills, insight to get down to the heart of the group task). Therefore, she invests a lot of time in training these basic skills, resulting in some occasional successful experiences when sticking to 'forms' of CL (e.g. JIGSAW) her pupils are used to.

"After a few months, I thought: 'They finally got it!' I was always convinced they could collaborate with each other, but the feeling of autonomy and taking initiative was very difficult for them in the beginning."

During the last months of the school year, the school climate starts to change. The new school principal, who values new teaching approaches, starts stimulating his team members to use CL. Nele's colleagues respond very enthusiastically, which creates possibilities to discuss problems and ideas regarding CL implementation in team. Nele is grateful for this opportunity for development, since she perceives the use of CL as an 'ongoing process'. Due to the short practicum periods in teacher education, she previously did not have the opportunity to grow in the use of CL. In her job, however, she can experiment with this instructional strategy repeatedly, changing her way of implementing it in close consultation with her colleagues and based on her previous experiences.

Pattern 3: Sander's story

Teaching is for Sander aimed at providing equal learning opportunities for diverse learners by making use of different instructional strategies. In his view, CL is valuable for primary school children since they like learning in groups and the learning results are good. As a student teacher, Sander preferred using CL in fifth and sixth grade within social studies and science, since most of these lesson topics can be adjusted to implement CL. Predominantly, he divided his class into groups of four to five pupils, giving each group the responsibility to elaborate on one subtopic. At the end of the week, they presented their findings to the other groups, so that each pupil had learned the content of each subtopic. During his practicum in education, he experienced that the success of CL largely depends on rules and a thorough preparation. However, since CL requires a lot of preparation, time was the biggest issue regarding the use of CL for Sander. Nevertheless, he was convinced he would continue using CL after graduation, although he had doubts about the impact of the school culture on his plans.

"I think you can do great things with CL, but only when the school and your colleagues have an open attitude. I heard from some friends that some schools are reluctant to new instructional strategies."

After doing some short replacements in different primary schools, Sander starts working for several months as a first-grade teacher. He rarely uses CL in his teaching practice, since he faces difficulties with giving responsibility for the learning process to these young pupils. They need much steering from their teacher

to learn the lesson content. In addition, Sander considers their reading abilities to be too low to work collaboratively in an efficient and effective way. Further, being a teacher instead of a student teacher, Sander suffers from the administrative work load, resulting in less time to prepare CL implementation. By the end of the school year, he plans to start a peer tutoring project for reading. That will be the first time he will use CL this school year.

4.2 Horizontal analysis

To discover student and novice teachers' motives to implement CL in their teaching practice, and determinants of success and failure in the use of CL, we focus explicitly on the communalities and contrasts in the teachers' stories.

Motives for (not) implementing CL in teaching practice

The following themes emerged from student and novice teachers' stories about whether or not to implement CL: (a) perceived opportunities and constraints to explore the use of CL, (b) feeling of being inspired and supported, and (c) the influence of pupils' characteristics.

a) Perceived opportunities and constraints to explore the use of CL

The extent to which student and novice teachers feel to have the opportunity to explore CL determines their actual tendency to implement CL. In particular, they specify three aspects that restrain teachers from exploring forms of peer collaboration: perceived lack of autonomy, structural factors (time and space), and the nature of school assignments for novice teachers.

Lack of autonomy. Student as well as novice teachers' perceive a lack of autonomy, negatively influencing their use of CL in teaching practice. Especially student teachers feel restricted in their opportunities to explore new teaching methods such as CL. During their teacher education programme, applying CL was compulsory in the second-year practicum of the student teachers in the present study. Most of the participants experienced this as rather threatening. Since their teaching performance is being evaluated, student teachers do not want to fail when experimenting with new instructional strategies, implying that they rely on rather familiar strategies. Yet they value the compulsory aspect of CL implementation in their practicum.

> *"At first, we thought: it's sufficient to know CL in theory, but eventually you experience new points of attention every time. The theoretical background is important, because*

without that you don't know how to start using CL, but using it during practicum is certainly even important." (Nele)

Some mentor teachers, however, prohibited the student teachers to implement innovative things, or they discourage or advise them against implementing CL.

"My mentor used to do things differently in his classroom, very strict and teacher-oriented. He asked me to do it the same way, although this didn't match my interactive teaching style. He did not allow me to try peer collaboration." (Kiara)

Other stories, however, illustrate that it can be different. Sander, for example, emphasises that he always has had carte blanche in choosing his pedagogical approach during practicum, and Emma explicitly points at stimulating mentor reactions although some of them were not used to CL.

Once graduated, novice teachers have full responsibility for their own classes. Nevertheless, the influence of the school context on the opportunity to explore the implementation of CL may not be underestimated according to the other novice teachers. Colleagues tend to try to 'protect' new teachers by dissuading them from using innovative instructional strategies.

"My colleagues say it's too difficult. Pupils are not used to collaborate." (Julie)

Structural factors. Structural factors also influence teachers' opportunity to explore the use of CL, and as a consequence the actual extent of CL use. In particular, both time pressure, space constraints, and group size restrain student and novice teachers from implementing CL.

Pressure in class time management makes it difficult to spend time using innovative instructional strategies. Student teachers perceive the programme of lessons they have to give as strict, while novice teachers perceive the educational programme as overloaded. This implies less time for instructional strategies such as CL, which are considered time-consuming. In addition, novice teachers experience pressure in their preparation time management. Many beginning teachers are referring to administrative tasks they did not have to do (so much) as a student teacher, e.g. marking. Having only limited expertise in teaching, preparing lessons and the additional administration takes so much time that it is difficult to opt for methods requiring more preparation time than whole-class instruction.

The space available in the classroom (de)motivates student as well as novice teachers to use CL. When classrooms are too small to rearrange tables, most of them abandon peer collaboration. Some teachers look for other opportunities in the school (e.g. the school restaurant), but often they experience problems with the acoustics

and the reservation of these rooms.

> *"The infrastructure is not suitable for CL. The classrooms are overcrowded, so you can't replace the tables. Only seldom, other rooms are available for CL. If the weather is good, you can go outside, but then you have other disadvantages."* (Samuel)

Class size is also often experienced as a constraint in CL use. Classes of more than 20 pupils are generally perceived as difficult to apply CL. Obviously, group size and space constraints are often related: the more pupils in the classroom, the less space available for rearranging the classroom. Nele and Caroline on the other hand are more inclined to use CL in classrooms of about 30 pupils, since it is easier to monitor the learning process in the different peer groups than in 30 individual pupils.

School assignments. Finally, the opportunity to explore the use of CL is often negatively influenced by the nature of the school assignments of novice teachers. Novices often start their career in education with assignments that are rather limited in duration and/or only part-time. Having no future in that particular class or school discourages novice teachers to invest much energy in using innovative instructional strategies such as CL. The story of Emily, who has a long-term full-time assignment in one school, illustrates the opposite.

> *"Because I'm teaching the same class during a whole school year, I can build something, which motivates me to put energy in it."* (Emily)

b) Feeling of being (not) inspired and supported

Novice teachers in some schools have the opportunity to experiment with innovative approaches within their pedagogical repertoire. It is however striking that this opportunity is often not a sufficient condition for novice teachers to actually use CL. In this respect, the stories refer to the impact of different sources of support and inspiration regarding CL implementation that reinforce the (lack of) motivation to use CL. Both the influence of textbook series, collegial support and leadership, and professional development are mentioned.

Textbook series. It is generally known that textbook series have a great impact on teaching practice (e.g. Yildirim, 2003). Although these can be inspiring for teaching, the stories of both student and novice teachers reveal that textbook series are often inhibiting the use of CL, since they only seldom include lesson suggestions

incorporating forms of peer collaboration. The lack of inspiration from textbook series creates additional time pressure for inexperienced teachers.

> *"Everything is much prescribed in textbook series. Sometimes I do wave this all aside and do my own thing, but when you are pressed for time, it's much easier to give the lessons as they are prepared in the course books."* (Sander)

Collegial support and leadership. A second source of inspiration and support can be provided by colleagues or the principal. As stated before, some team members advise novice teachers against using CL, decreasing the perceived autonomy of the latter to select their pedagogical approach. Emma, Emily, Samuel, Kelly, and Nele experience the influence of the school team as more positively. Their principals are enthusiastic about CL and stimulate all team members to try and improve the use by continuing implementation. In these cases, related professional development was an inherent part of the stimulating environment. Nele's principal got interested in CL after a training about (inter)active instructional strategies. He went deeply into the subject and now coaches his team when they ask for help in designing lessons with CL. Emma's principal provides his team with books with lesson suggestions and background information about CL in order to stimulate them. Next to the motivating impact of the principal, these beginning teachers experience a lot of collegial support and coaching in their use of CL, and they do the same for their colleagues. Emily's school promotes the use of CL even more by making explicit engagements on the school level as to the integration of CL. For each grade the school team agreed on forms and aspects to use during CL implementation, so that pupils become gradually familiar with working collaboratively during their primary school career. As a consequence of the team support, novice teachers appear to become more motivated to use CL in their teaching practice.

Professional development. Finally, professional development is an important motive for CL implementation, both as a source of inspiration and as a boost for teachers' self-efficacy. The stories of the student teachers make clear that their apprenticeship of observation regarding CL is rather limited and often negatively coloured. However, Lynn says:

> *"You adopt an instructional strategy more easily when you have experienced it yourself, because you can think through the necessary steps and crucial moments."* (Lynn)

Therefore, all student teachers in the present study were prepared during four workshops. Although this training was rather limited (four times two hours), it was strongly valued by the student teachers. Professional development is perceived as

encouraging and stimulating to try new instructional strategies in practice. Although in-service training about this instructional strategy was not yet present in the schools, many novice teachers perceive this useful for their colleagues.

> *"If in-service teacher training will go into the topic of CL and what you can reach with that instructional strategy, it would be convincing. In my view, teachers do not have the attitude to look for professional development opportunities, but when it 'comes' to them they are very enthusiast and open for it."* (Hannah).

The stories of student and novice teachers stress the importance of combining a theoretical and practical orientation in professional development regarding CL use. In addition, Julie and Kiara ask for suggestions for using CL in particular subjects, since that was not fully covered in the general training.

c) Pupils' characteristics

Pupils' characteristics are also cited as important reasons to (not) implement CL. More particularly, children's age and their related competences are referred to: the younger the children, the more difficult students and novice teachers perceive the use of CL, so the less they are willing to implement it. Mainly children from first grade are perceived (a) to be too self-centred, competitive, and easily distracted; (b) as not yet having the basic social and cognitive skills necessary for CL; and (c) to need too much guidance and steering. Four student teachers slightly modify the view that young children are not yet ready for CL by suggesting that some subjects (e.g. musical education) permit the use of CL (Kiara and Kevin) or by suggesting that specific forms of CL makes it possible (Emma and Emily).

> *"In first grade, it will be difficult to use CL, I think, but I believe that young children also need to learn to work together. Maybe it is not more difficult in first grade, you just have to try other things and forms."* (Emma)

After graduation, Kiara and Kevin reconsider their view and state that older children from fifth and sixth grade are much harder for each other during peer collaboration and less dutiful, making teachers think twice about the use of CL.

Further, some student teachers have serious doubts about implementing CL in inclusive classrooms or classrooms with a heterogeneous developmental level. They believe that pupils – or at least themselves as teachers – will consider the group composition unfair given the big differences. Julie and Samuel, who started teaching a group of pupils with special educational needs (SEN) after graduation, experience

the use of CL indeed differently than in 'regular' primary school classrooms. Their pupils are generally less socially skilled and often experience difficulties with understanding the task. However, it does not prevent them from using peer collaboration.

> *"In our school, pupils get lessons in social skills during half an hour per week. I think this is not effective enough, you have to pay attention to social skills and peer collaboration during the other lessons too. Therefore, CL is at least even important for pupils with SEN."* (Julie)

To make it work for their pupils, Julie and Samuel invest additional time in the instruction of CL by making the collaboration process visible (using pictograms), they make smaller groups (maximum 3 pupils), and pay extra attention to the attractiveness of and differentiated instruction within the group assignment. Samuel emphasises that the teacher has to lower his expectations too.

Familiarity with CL and pupils' willingness to collaborate are also strong influential factors for implementing CL. No differences are found in this perception during practicum or after graduation. Many student and beginning teachers work with children that are not used to work and learn together. Consequently, pupils prefer to work alone or get whole-class instructions. At that point, teachers might start doubting about CL use. However, they experienced the importance of a sustained use of CL. Emma explains why in her story:

> *"In the beginning, peer collaboration was difficult. Children reacted like 'oh no, do I have to collaborate (with him/her)?'. Now they know: it can be fun and interesting to work together." (Emma)*

Indeed, after some weeks of using CL, all teachers notice a changing motivation in the pupils: they are much more motivated and fascinated, and they appreciate the variety in instructional strategies. As a teacher, this makes it pleasant to use CL. Emily emphasises the importance of group composition to retain the pupils' willingness to collaborate.

> *"You have to think seriously about making groups: which combination will work out fine, both with respect to the learning result as to the group process? A bad combination can make pupils loose all their willingness to collaborate."* (Emily)

Success and failure in CL implementation

The stories of the novice teachers contain a lot of references to experiences of success and failure in CL implementation, both during practicum periods as during teaching after graduation. Some topics were also referred to above as motives for CL implementation, but the perspective is different when these topics are related to success and failure.

Student and novice teachers refer both to aspects regarding efficiency and effectiveness of CL implementation when they discuss success and failure. As presented in Table 2, teachers' experiences are structured into four levels: pupil, classroom, teacher, and lesson level. The school level was not mentioned in the experiences regarding the success and failure of CL use.

a) Pupil level

At pupil level, three different aspects are largely influencing the success of CL in primary school. First, CL implementation appears to be more effective when the pupils are already familiar with this instructional strategy. During practicum periods, when student teachers are teaching only for some days or weeks in a classroom, pupils' unfamiliarity with CL creates problems, particularly regarding class time management.

> *"You notice that in some classes, CL is not yet frequently used. You have to give more extensive instructions and pay more attention to rules and agreements, otherwise it will fail."* (Vanessa)

Beginning teachers are experiencing the same problems, however they have time to use CL more frequently to make their pupils more familiar with this instructional strategy. After repeated use, it runs more smoothly and efficient.

Second, pupils' age and related competences are not only a reason for novice teachers to (not) implement CL, it also influences the effectiveness of this instructional strategy. Five student teachers refer to children of first and second grade as being too young and therefore not yet capable of collaborating. When trying to use CL in these groups, the teacher has to intervene so often that the purpose of CL is undone. Also after graduation, pupils' age and competences remain an issue regarding the success of CL. Some of the teachers who previously stated that CL turns out to be less successful with younger children, change their view after finding a teaching job in first or second grade. They still experience problems with children's unfamiliarity with CL, but after some time these problems disappear so they cannot be attributed to pupils' age. Other beginning teachers emphasise the

Table 2. Factors influencing success and failure in CL implementation in novice teachers' view

	1		2		3		4		5	6	7		8		9	10		11		12		13		14		15		*Occur-rence*
	I	II	I	II	I	II	I	II	I	I	I	I	II	I	I	II	I	II	I	II	I	II	I	I	II		
PUPIL LEVEL																												
Familiarity with CL use		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	23
Competencies and age	✓	✓	✓	✓		✓	✓	✓		✓			✓			✓		✓				✓	✓				13
Attitude of pupils		✓	✓	✓				✓		✓	✓			✓		✓		✓	✓	✓		✓					12
CLASSROOM LEVEL																												
Physical space		✓		✓	✓	✓										✓		✓				✓				✓	8
Classroom climate				✓	✓	✓											✓							✓			5
Number of pupils					✓						✓									✓							3
TEACHER LEVEL																												
Be acquainted with the pupils	✓				✓						✓	✓	✓		✓	✓	✓	✓	✓		✓	✓				✓	13
Appropriate expectations regarding success/failure		✓		✓				✓								✓											4
Teaching competences													✓									✓					2
LESSON LEVEL (CL IMPLEMENTATION)																												
Lesson preparation			✓	✓	✓	✓					✓	✓	✓		✓	✓	✓		✓		✓		✓				13
Instructional aspects																												
Individual accountability	✓	✓	✓	✓		✓	✓				✓		✓	✓	✓		✓				✓		✓	✓	✓		15

Table 2 continued

Monitoring and guidance	✓	✓	✓	✓			✓				✓	✓		✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	17
CL design, task and materials adjusted		✓	✓					✓			✓	✓	✓		✓		✓	✓	✓	✓		✓			✓	✓	13
Instruction		✓	✓	✓		✓				✓		✓	✓		✓		✓	✓	✓						✓		12
Use of roles		✓	✓		✓							✓			✓			✓	✓				✓	✓	✓	10
Visualisation/demonstration/ concreteness	✓	✓	✓	✓	✓							✓				✓		✓								✓	9
Fit in with pupils' interests (attractiveness)	✓				✓	✓		✓						✓				✓	✓		✓						8
Positive interdependence						✓												✓					✓		✓		4
Goal-orientedness			✓									✓															2
Aspects regarding evaluation																											
Reflection as a teacher		✓			✓					✓	✓				✓				✓	✓	✓			✓	✓	10
Evaluating the group process	✓		✓	✓			✓								✓	✓	✓		✓				✓		✓	10
Organisational aspects																											
Rules and agreements		✓	✓	✓		✓					✓						✓		✓	✓	✓	✓	✓			11
Group composition	✓	✓	✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	19
Choice of the subject		✓																									1

success of cross-age peer collaboration.

Third, teachers were referring to the attitude of pupils in obtaining success in CL. Pupils need to have an appropriate attitude or respect towards each other and the teacher, otherwise successful implementation of CL is perceive as impossible.

> *"When pupils are saying: 'Working in groups, that's time to play!', you are no longer under full command of the situation as a teacher. It will turn out as a disaster."* (Hannah)

b) Classroom level

The classroom level is less often mentioned by teachers. The physical classroom space is predominantly an influential factor for beginning teachers. A well-considered reorganisation of the classroom is often neglected duo to time problems, creating problems during collaboration. The groups of pupils often sit too close, which interferes with the efficient communication between group members.

Next to the physical space, the classroom climate is referred to exclusively in relation to CL failure.

> *"The classroom climate is a starting point, that has to be good. Only if that's ok, the success of collaborative learning can follow."* (Kevin)

Additionally, teachers also state that CL has the potential to improve the classroom climate, but only when there are no preceding problems in that respect. Concerning the impact of the number of pupils, Kiara, Caroline and Sander attribute at least one failure experience to classes with more than 25 pupils, making it impossible for them to provide sufficient monitoring and guidance. However, the stories of other beginning teachers in comparable large classrooms make clear that success is however possible when factors on the pupil level are beneficial (e.g. familiarity).

c) Teacher level

Being acquainted with the pupils, is the most influential aspect of CL success on the teacher level. Many student teachers attribute failure in using CL to not knowing their pupils well enough to compose successful groups. Observing pupils (as is mostly done prior to the practicum) appears insufficient to gain insight in pupils' characteristics. The collaboration with mentor teachers often fails to compensate this lack of knowledge.

> *"Everything went wrong, I made a wrong decision in my group composition since I didn't know the pupils very well. The first thing my mentor said after that lesson, was: 'I had expected that'. I was wondering why she didn't adjust my group composition after having read my lesson preparation."* (Kiara)

After graduation, beginning teachers have the opportunity to use CL with children they know better. Three novice teachers emphasise this as strongly influencing the likelihood of successful CL use. Further, novice teachers readjusted their expectations regarding successful CL use as a result of their continuing experiences in educational practice.

> *"I have learnt to differentiate in my expectations of success in CL for every individual pupil. For example, I have a boy with autism in my class, which is very difficult during peer collaboration. I feel it as a success when he succeeds in staying in his group and when his group members try to involve him in the process."* (Nele)

d) Lesson level

Characteristics of a specific lesson appear to be most important in predicting success/failure in CL implementation. Three types of characteristics play a role: instructional aspects, aspects regarding evaluation, and organisational aspects. The lesson preparation, which is considered very important according to many student and novice teachers, covers these categories.

First, teachers refer to instructional aspects explaining the success of CL implementation, namely structuring of individual accountability, teachers' guidance and monitoring behaviour, and adjustment to pupils' level and interests. These aspects got predominantly attention in student teachers' stories.

Individual accountability largely influences CL effectiveness according to 10 student teachers and 5 beginning teachers. They believe that pupils should be made accountable for their own contribution to the group work, otherwise some of them will profit from others' efforts and will disturb the efficiency of the process. Most teachers refer to the use of roles, making each pupil responsible for at least one specific task during collaboration.

The influence of both the quality of instruction (which has to be structured, complete, and more detailed when pupils are not used to CL) and teacher responsibility in monitoring and guidance during the process are also perceived as very important. Particularly student teachers emphasise that teachers' well-timed interventions improve both the efficiency and effectiveness of CL. For example,

they act as a mediator in twists, give suggestions or remarks regarding the content to improve the quality of the work, distribute compliments and motivating words, ….

Logically, CL will be more successful when the design, the task and the materials are adjusted to pupil's educational level and interests. However, many student as well as beginning teachers experience difficulties estimating pupils' level, resulting in failure of the collaborative process.

> *"I was once using JIGSAW, but it didn't run smoothly. In fact, it was too difficult, the texts were too difficult, they didn't know how to answer the questions. I stopped this lesson and made some adjustments according to their level. Two days later, we tried it again. It went more efficient, and this time the result was as I expected."* (Emily)

In order to adjust CL to pupils' level, some student and beginning teachers refer to the importance of visualisation and concreteness. It appears to be useful to outline the organisation of the collaborative process on the blackboard, or to illustrate roles by making necklaces. During the first times of CL use, it is also perceived useful to demonstrate communication situations (e.g. how to ask for help?) or organisational aspects (e.g. how to rearrange the classroom efficiently?).

Secondly, success and failure were also attributed to evaluative aspects. Teachers' refer to two levels of assessment. First, teachers attach great importance to the evaluation of the group process, since it might improve the success of future use of CL. When pupils gain insight in what went wrong and how they can tackle the problem, the risk of failure decreases. Further, they perceive it as important to reflect on the CL implementation as a teacher. More successful future use of CL needs thorough consideration and reflection on positive and negative elements.

Third, organisational aspects affect the success of CL. The composition of well-considered groups is perceived as a core aspect of successful CL implementation. As stated above, this is only possible when teachers have enough information about their pupils. The formulation of rules and agreements, including the consequent application, is also affecting the efficiency of the collaborative process. Although many stories illustrate teachers' preference for using CL in particular school subjects (predominantly social studies and science), only one teacher holds the conviction the subject is also influencing the success of CL:

> *"I experience the use of CL more successful in a music lesson, for example, because there is less content-related pressure. They get on better when something goes wrong in these subjects."* (Julie)

5. Discussion

This study presents the stories of teachers about their experiences with CL during teacher education as well as during their first year in the profession. The findings illustrate their motives for (not) using CL in teaching practice, and their perception of factors influencing success or failure during CL implementation.

5.1 Interpretation of the research findings

As to novice teachers' motives to (not) implement CL findings indicate that they tend to implement CL more (a) when they experience opportunities instead of constraints to explore innovative instructional strategies, (b) when they are supported and inspired, and (c) when pupil characteristics allow for peer collaboration. Generally, the cases illustrate that CL implementation in teaching practice has to be interpreted differently for beginning teachers than for senior teachers. In this respect, the contrast with the study of Abrami et al. (2004) is remarkable. They found three major factors within senior teachers' motives to use CL, namely perceived value of CL, expectancy of success, and perceived cost.

In the present study, novice teachers refer more to issues typical for their particular situation as an inexperienced teacher, instead of referring to the value and expectations of CL as stimulating issues for CL implementation. This supports the view of Siegel (2005b), who states that CL implementation is largely influenced by contextual factors. In the present study, contextual factors are particularly related to the amount of 'autonomy and support' novice teachers get to explore the use of CL. In their role as a student teacher, the threatening character of using CL during practicum periods is stressed. In line with Klein (2001), student teachers tend to perceive that *'the classroom is not the place to take risks when marks are concerned'* (p. 236). This motive is even reinforced by the fact that they often teach classes they do not know well. Since the studies of Lou et al. (1996) and Gillies and Boyle (2010) pointed at the importance of taking into account friendship and pupils' abilities to compose effective groups, it is not surprising that group composition creates difficulties for student teachers, increasing the risk of failure.

The perceived cost of CL, which is found to be negatively related to CL implementation (Abrami et al., 2004), comes into both novices and senior teachers' motives. The time-consuming character of CL is frequently mentioned as diminishing their opportunities to explore this instructional strategy, agreeing with the 'frustrating reality' as Sharan (2010) names it: *'Once the formal training programme ends, CL is often abandoned, or at best, practice is significantly reduced'* (p. 303).

Further, the opportunities to explore CL are believed to be negatively influenced by a lack of autonomy as well. However, the autonomy of a student or beginning teacher has to be clearly balanced in relation to collegial support and guidance. The case of Emma in the present study reinforces the view that shared interests of the complete school team in innovative practices – and not only the principal, although he might be an impetus – largely increase the collegial support and guidance. This affirms the results of Ishler et al. (1998), Krol et al. (20008) and Veenman et al. (2000) for senior teachers. In line with Dymoke and Harrison (2006), who warn for the pressure of institutional conformity for beginning teachers, the balance between collegial relationships and autonomy appears to be an issue for novice teachers as well. Next to collegial support, the motives of novice teachers to use CL appear to depend on their feeling of 'being inspired'. In this respect, it is important to take into account that novice teachers attach great importance to training and practical examples as a source of inspiration. This is consistent with the study of Lopata et al. (2003), who found that the gap between preferred and actual use of CL is smaller for teachers who followed staff development on CL. However, the vertical analysis in this study provides evidence for differences between beginning teachers in their use of CL, notwithstanding the fact that they have received the same training in teacher education. No doubt professional development appears to be a necessary condition (Sharan, 2010), but it is inadequate in itself to get a new strategy adopted in education. The way professional development is experienced is at least even important. Therefore, some issues might be useful to take into consideration. First, many stories in this study reflect the appreciation of combining theory and practice during the training. Beginning teachers agree about the necessity of professional development including theoretical and empirical notions about CL, as well as a practical part. This can be integrated in teacher education in two different ways. Teacher educators can adopt CL far more during their lessons. This modelling experience may promote the use of this strategy in the teaching experience of their student teachers. Besides, the teacher education curriculum has to include field experiences with CL in schools. Second, novice teachers' experiences with CL reveal that they are lacking inspiration. Follow-up training may be essential, both as a source of inspiration and as a stimulus for sustained implementation, as suggested by Abrami et al. (2004) and Shachar and Shmuelevitz (1997).

As a second aim, this study investigated teachers' attributions regarding success or failure of CL implementation. Student and novice teachers perceive the success of CL both in terms of effectiveness as well as efficiency, whereas previous research focused predominantly on the effect of CL on pupils' learning process (e.g. Marzano et al., 2001). Further, the present findings shed light on changing interpretations of

'success' in CL use. After several times of use, some novice teachers tend to readjust their expectations to their particular group of pupils. This finding puts the results of Abrami et al. (2004) in a different light. They found that senior teachers' expectancy of success of CL significantly influences their motivation to use CL. However, a changing interpretation of 'success' might also influence the expectancy of success and therefore the use of CL. The interpretation of success or failure in CL implementation therefore appears to be an interesting topic for further research.

As stated in the theoretical framework, previous studies on the success of CL focussed predominantly on the importance of structuring the key components of cooperative learning (e.g. Johnson & Johnson, 1999) and on the role of the teacher in the enrichment of pupil interactions (e.g. Gillies, 2006; Webb, 2009). Individual accountability and the evaluation of the group process as two of the key components of Johnson and Johnson (1999) are often mentioned by the novice teachers as influencing CL success or failure. The present study indicates that novice teachers also attach also great importance to opportunities for direct interaction, as becomes clear by their references to the influence of the physical space in relation to classroom re-arrangements. However, the other key components for effective use of CL (Johnson and Johnson, 1999) are far less associated with success in CL implementation by the participants of the present study. Positive interdependence is only referred to a few times, while social goals and objectives are not mentioned once in the stories. Novice teachers tend to withhold using CL until their pupils get on very well with each other. They perceive a positive classroom climate as a necessary condition for CL, rather than seeing the opportunities of CL to improve pupils' social functioning (Johnson et al., 2001; Tolmie et al. 2010).

Although not all key components of Johnson and Johnson are emphasised in student and novice teachers' perception regarding success in CL implementation, they do attribute success or failure predominantly to issues on the level of the preparation of a specific lesson. This is consistent with findings of Pinsky (1997) and Pinsky et al. (1998). A well-considered group composition, for example, is in almost 80% of the interviews of the present study linked to success in CL use, which confirms also the view of senior teachers from Gillies and Boyle's recent study (2010). However, previous research ascertained that group composition is mostly limitedly considered in lesson plans (Ruys et al., 2012b; see Chapter 5 of this dissertation). It may therefore be interesting for future research to investigate the link between lesson plans and the actual implementation of CL. How does the quality of anticipation in lesson plans might influence particular aspects of success in teaching? We suggest a longitudinal approach since Mutton, Hagger and Burn (2011) found that lesson planning is still a feature of beginning teachers' learning process.

Although factors on the lesson level are highlighted, the present study also reveals issues on the pupil, classroom, and teacher level as related to the success of CL. These findings supplement previous research and emphasise that success and failure can remain constant for a longer period of time, irrespective of teachers' preparation and pedagogical approach. In this respect, the stories of novice teachers refer predominantly to the influence of pupils' familiarity with CL to make CL successful. At first, CL use is often related to failure because pupils do not understand yet how to collaborate efficiently and effectively. Consequently, it often takes often a longer period of time to obtain success in CL. It implies the necessity for teacher education to opt for practicum periods of sufficient length. Further, young children are generally perceived to be not yet competent for peer collaboration. This contrasts sharply with novice teachers' perception that an increased familiarity with CL of pupils positively influences the success of implementation: it may be applicable for younger children too.

Finally, it is striking that student and novice teachers only seldom attribute the failure of CL directly to their own competences, but rather to the lack of adequate preparation of their lessons. Further research should reveal the relationship between teacher competences, the quality of lesson preparation, and success/failure in CL implementation.

5.2 Limitations of the study

As stated before, research on CL implementation has this far predominantly been based on quantitative measures of effectiveness and on questionnaires about factors influencing the use of this instructional strategy. In the present study, the stories of novice teachers provide a qualitative view on this topic. Although this yields more rich, detailed and contextualised data, some cautionary limitations need to be addressed.

First, the relatively small number of cases implies a larger risk of bias and is therefore a potential threat to the study's validity. Although we carefully selected the cases taking into account important parameters for sampling, the results may not be generalised for all novice teachers (especially not the teachers without any CL training). Further, the questions in the interview guideline were predominantly retrospective, appealing to participants' memory. To reduce this potential threat, we split the interviews over two moments: one just before graduation (Interview I) and one after a considerable period in the profession (Interview II). Memories about practicum periods can therefore not be influenced by teaching experiences after graduating. To further improve the validity of our study, we included member checks as a form of respond validation (Huberman & Miles, 1998).

Second, this study provides insight into novice teachers' motives for (not) implementing CL teaching practice. About a decade ago, Veenman et al. (2002) studied the short-term effects of CL training on student teachers' intentions to use this instructional strategy. The present study studied not only the intentions, but also teachers' reported pedagogical behaviour during the first year in the profession. However, insights in the longer run still have to be investigated. In addition, the number of four workshops in this study may have been too restricted to yield impressive results, although the teachers' stories tell us that most of them appreciated the training and evaluated it as sufficient.

Finally, this study goes more deeply into the experiences of success and failure in CL implementation. However, success and failure are based on subjective experiences of student and novice teachers and not based on objective measurements. Since Oortwijn et al. (2008) stated that *'it might be that teachers did not accurately perceive the effectiveness of their own CL activities'* (p. 157), caution is needed during the interpretation of the findings of our study.

5.3 Implications for policy and practice

Educational researchers are searching for ways to integrate findings from research into practice, particularly innovative ideas and strategies. Comparing the present study with previous studies, elucidates CL implementation in teaching practice has to be interpreted differently for student and beginning teachers on the one hand and senior teachers on the other. Important implications educational practice and policy can therefore be delineated.

Overall, an open and stimulating school environment seems to be one of the most important aspects influencing student and novice teachers' motives regarding CL use. Many student teachers emphasise the threatening character of CL use during their practicum (since they were evaluated). Therefore, it might be useful for teacher training to consider the first experiences with CL use in a non-evaluated practical experience period. Student teachers also frequently mention failing when they do not know the pupils very well. This might mortgage continuing use of CL in the future. Therefore, teacher training should to pay attention to the length of practicum periods, so that teachers can get acquainted sufficiently to the pupils in view of adequate group composition. Longer practicum periods also offer the opportunity to use CL repeatedly in order to familiarise pupils with this instructional strategy, which is perceived to influence experiences of success in CL implementation. In addition, it can be useful to concurrently combine pre-service training regarding CL for student teachers and in-service training for mentor teachers regarding CL. This combination might stir mentor teachers' curiosity for CL, creating a more stimulating environment for student teachers to experiment with CL. In addition,

mentor teachers will be more competent after training to support student teachers by providing useful feedback.

The novice teachers' stories support the often-heard demand for additional guidance and support for teachers when entering the profession. The case of Steven clearly illustrates the 'transition shock' (Korthagen et al., 2006) that many beginning teachers are facing. The administrative pressure, short replacement periods, and the lack of prospect for the future discourage them to invest into the time-consuming preparation of innovative pedagogical approaches. Educational policy can comply with this call for support by giving novice teachers more time to invest in their teaching practice. Further, steps should be taken to ensure collegial support for novice teachers to provide guidance and to create a stimulating environment for innovative teaching. In this respect, peer-coaching in education appears promising (Zwart et al., 2008), especially since Meirink et al. (2007) demonstrated a relationship between professional learning communities and the implementation of innovative instructional strategies. For student teachers, we therefore suggest to add reflection groups to the CL training in teacher education, giving student teachers the opportunity to exchange experiences. Although many teachers in the present study plea for examples for the use of CL in textbook series as a relevant source of inspiration, we recommend however caution since it also bears the risk of teachers becoming 'apparatchiks of the textbook curriculum' (Coulby, 2000). Both peer-coaching and reflection groups may succeed in countering a curriculum consuming attitude.

Finally, the attainment targets determined by Flemish government (Ministry of the Flemish Government, 2010), include only some cross-curricular expectations about learning to work in groups for primary school pupils. It might be important that teacher educators refer to the opportunities of using CL in different subjects. Further, the findings of this study regarding success and failure within CL suggest the importance of developing these cross-curricular expectations for each grade in particular. This would make the use of peer collaboration a shared matter of all primary school teachers. Pupils would have the opportunity to become familiar with working collaboratively step by step during their school career. In this case, further research on the continued impact of CL is needed, since most studies on the effectiveness of this instructional strategy were concentrated on a shorter period of time.

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7 General discussion and conclusion

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CHAPTER 7
General discussion and conclusion

1. Problem statement

In the first chapter of this dissertation, we introduced our research framework on the importance of integrating collaborative learning (CL) in the curriculum of pre-service teacher education. We endorsed to the view that CL can be seen as covering all peer collaboration methods, amongst which for example peer tutoring and cooperative learning (e.g. Dillenbourg, 1999; Meloth & Deering, 1999). We considered positive interdependence, individual accountability, promotive interaction, attention for social skills, and group processes (Johnson & Johnson, 1999) as necessary conditions for effectiveness of the broad range of potential CL strategies.

Many previous studies provided evidence for positive effects of CL on primary school children's cognitive, social-emotional, and psychological development (e.g. Johnson & Johnson, 1999; Marzano et al., 2001). More recent international research stressed the important role of the teacher to obtain these positive results (Hertz-Lazarowitz, 2008).

Notwithstanding the recommendations of scholars regarding the effectiveness of this instructional strategy, CL is only implemented to a small extent in educational practice (Baines, Blatchford, & Kutnick, 2003). Teachers often attribute this limited implementation to a lack of competences and understanding about this instructional strategy (Abrami et al., 2004; Baines et al., 2003; Gillies & Boyle, 2010; Veenman et al., 2000). Consequently, the importance of professionalisation of teachers is gaining interest. Teacher education is held responsible for preparing teachers with the background of CL and the actual implementation of it in teaching practice (Cohen et al., 2004; Grossman, 2005). Until now, research on implementing CL has mainly focussed on in-service training for senior teachers (e.g. Ishler et al., 1998; Krol et al., 2008). It is, however, at least even important to focus on CL in pre-service teacher education in order to familiarise generations of new teachers with the concept and implementation of CL.

Further, prior studies on the impact of teacher training regarding CL implementation are predominantly oriented towards beliefs and intentions to use CL (e.g. Abrami et al., 2004; Veenman et al., 2002). In this respect, the investigation of teachers' actual competence as well as the impact of training has been largely overlooked in the literature, although the restricted implementation of CL is often attributed to a lack of competences (Abrami et al., 2004; Baines et al., 2003; Gillies

& Boyle, 2010; Slavin, 1999). Therefore, the present dissertation emphasised the development of student teachers' competence with regard to CL implementation.

2. Research objectives

The general aim of the research presented in this dissertation was to gain insight into the current implementation of CL in pre-service teacher education in Flanders (Belgium) on the one hand, and to study and further develop student teachers' competences with regard to CL implementation on the other hand.

Five research objectives were introduced in Chapter 1 to address this general research aim, and were tackled in the empirical studies that were described in Chapters 2 to 6.

RO 1	*Exploring the current implementation of CL in pre-service teacher education in Flanders.*
RO 2	*Developing instruments to measure student teachers' competences regarding the use of CL.*
RO 3	*Studying student teachers' competences and competency development regarding the use of CL, and the impact of an explicit training programme in this respect.*
RO 4	*Examining how student teachers prepare for CL implementation.*
RO 5	*Investigating how teachers experience the use of CL implementation during practicum periods in teacher education and during their first year in the teaching profession.*

To reach the objectives, three empirical studies were set up. First, an *exploratory study* was set up to gain insight into the state-of-the-art of CL in pre-service teacher education (RO 1). Second, after the development of appropriate measurement instruments (RO 2), an *intervention study* was completed in order to investigate and improve student teachers' competence (RO 3) regarding CL implementation. A training programme including four 2-hour workshops was established in the second year of the teacher education programme in three university colleges. In addition to the workshops, student teachers were also required to use CL during their practicum periods. Two colleges participated as a control group: student teachers only used CL during practicum, but they were not explicitly trained in CL. To study student teachers' competence in instructional planning pertaining to CL implementation (RO 4), lesson plans from teaching practice during practicum periods were collected and analysed. Third, we conducted a qualitative *follow-up study*. Participants from the

experimental condition in the intervention study were selected and studied during two additional years in order to examine their further experiences with CL (RO 5).

3. Overview and discussion of the main findings

We will now discuss the main findings that were reported in Chapter 2 to 6 for each of the five research objectives respectively. We relate the findings to previous studies, going also more deeply into the strengths, limitations, and implications of the methods and findings.

RO 1	*Exploring the current implementation of CL in pre-service teacher education in Flanders.*

The exploratory study aimed to meet the first research objective and explored the integration of CL in pre-service teacher education in Flanders. As was described more in detail in Chapter 2, data were collected by means of both a student teacher (n = 369) and a teacher educator (n = 369) survey in 16 pre-service primary teacher education colleges. In addition to existing instruments (e.g. Abrami et al., 2004), some new scales were developed and their psychometric qualities were examined on. Quantitative research techniques were used to analyse the data.

Main findings

The main findings related to the first research objective were threefold, providing information concerning student teachers' and teacher educators' conceptions towards CL, their self-efficacy in CL implementation, and concerning the extent of CL implementation in pre-service teacher education.

First, the findings revealed that both participant groups have rather positive conceptions about CL in primary school classes. These results are quite similar with senior teachers' conceptions, as reported by Abrami et al. (2004). In line with the findings of Donche et al. (2003), however, it was found that student teachers value CL less high for their own learning process than other learning strategies, such as the use and intake of knowledge for example. Based on this result, it can be hypothesised that student teachers may have had negative experiences with CL. In this respect, future research has to further explore the impact of the 'apprenticeship of observation' (Lortie, 1975) and educational experiences as a student on the educational preferences and pedagogical behaviour of student teachers.

Second, it was found that student teachers and teacher educators feel themselves only moderately competent in the use of CL. Surprisingly, no differences

were found in the feelings of self-efficacy between student teachers throughout the three successive years of teacher training, although we might expect that an adequate training may increase their self-efficacy beliefs (Abrami et al., 2004). This finding can serve as an argument to pay more attention to student teachers' professional development with regard to CL in pre-service teacher education.

Third, with regard to the actual implementation of CL in Flemish pre-service teacher education, the exploratory study revealed that CL is only limitedly implemented, despite the expected modelling function of teacher educators (Loughran, 2006; Swennen et al., 2008). Teacher educators reported an infrequent use of CL as an instructional strategy in their lessons. Moreover, they paid even less attention to the explicit training of student teachers regarding the pedagogical use of CL. Further, teacher educators paid more attention to CL when they became more familiar with this instructional strategy through in-service training, and when their expectations towards CL were higher. Professional development on the topic of CL for teacher educators can therefore be recommended.

Strengths, limitations, and implications

The main findings in Chapter 2 underline the lack of attention to CL in pre-service teacher education in general, and to the competency development of student teachers in particular. Since we surveyed a student teacher and teacher educator sample in 16 of the 21 Flemish teacher education colleges for primary schools in Flanders, and since the participants covered the three years of the teacher training programme, the results are believed to be generalisable for the daily routines of Flemish teacher education as a whole.

The combination of a student teacher and a teacher educator perspective is without any doubt a notable strength in this exploratory study. In previous studies on CL in teacher education, only student teachers' perspective was addressed (e.g. Veenman et al., 2002). Our study is the first to combine it with the perspective of teacher educators in relation to CL implementation. The combination of both stakeholders as a form of data-source triangulation provides the opportunity to cross-check the data, to compare both perspectives, and to complement their views in order to get a more holistic picture of CL implementation in pre-service teacher education (Cohen, Manion, Morrison, & Morisson, 2007). However, we only combined the complete sample of student teachers' and teacher educators' perspective, as the sample size did not allow comparisons at college level.

Unfortunately, we also have to acknowledge some limitations in the design of the data collection. The use of self-reported measures on CL implementation bears the risk of a social desirability bias in teacher educators' answers. This risk was partly set off by collecting information from student teachers, who however might

tend to answer questions in a socially desirable way as well. In addition, the pure quantitative measures that were used may not cover the full range of respondents' beliefs (Borg, 2006). Within the scope of the present study, we were however not able to gather observational data or other types of qualitative data of teaching practice in teacher education colleges to verify the relationship with the self-reported quantitative measures.

Based on the main findings for the first research objective, it is advisable that the pre-service teacher education curriculum in Flanders would pay more attention to CL. To date, student teachers are insufficiently prepared for using this instructional strategy in their future primary school classes, although they largely value CL. In the context of this dissertation, this need was met by introducing a training intervention on CL in several teacher education colleges. We reported in Chapter 3 and 4 about the impact of this training on student teachers' competence regarding CL implementation, as an answer to research objective three.

RO 2	*Developing instruments to measure student teachers' competences regarding the use of CL.*

Prior to the intervention study, appropriate research instruments had to be developed to measure student teachers' competence regarding the use of CL (RO 3). In the general introduction (Chapter 1), we already substantiated the focus in the present dissertation on student teachers' knowledge and skills regarding the implementation of CL, although Korthagen (2004) describes 'competence' as the whole of knowledge, skills, and attitudes. In view of the fourth research objective, we also had to develop an adequate instrument for measuring student teachers' abilities in preparing lessons including CL for their students.

Main findings

As to the measurement of *student teachers' knowledge regarding CL*, an assessment task was developed (Chapter 3). The questions in the task are based on contemporary handbooks and scientific literature (e.g. Gillies et al., 2007). Each question in the task corresponds with a specific process dimension of Bloom's revised cognitive taxonomy (e.g. remembering, understanding, applying, analysing, evaluating, or creating) (Anderson & Krathwohl, 2001). The answers of student teachers are scored (max. 5 per question) according to a 'closeness measure' (Kraiger, Salas, & Canon-Bowers, 1995), making a qualitative comparison between the content of student teachers' answer and the criterion answer. In view of face

validity, the task and the related scoring system were discussed with an expert panel. The inter-rater reliability between two independent researchers was good.

As to determining *student teachers' skills in implementing CL*, the Evaluation of Collaborative Learning Scale (ECLIS) was developed in a student teacher version (in the form of self-report) and in a version for mentor teachers (in the form of an observation instrument) (Chapter 4). The ECLIS consists of 41 items. The items are structured around three different lesson phases: introduction, process, and consolidation phase. On a scale from 1 (very bad or absent) to 10 (excellent), the behaviour that is described in the items can be scored according to the enactment of it.

Principal Component Analysis (PCA) with oblique rotation ($\delta = 0$) resulted in six factors. For the introduction phase, one factor was found and named *'quality of the instruction'* (12 items). The process dimension comprised 4 subscales: *'organisational guiding'* (6 items), *'social-affective guiding'* (4 items), *'(meta-)cognitive guiding'* (4 items), and *'realisation of the key components of collaborative learning'* (7 items). The consolidation phase consisted of one subscale, namely *'consolidation and evaluation'* (6 items). Confirmatory factor analysis (CFA) showed an acceptable model fit (Byrne, 2001).

The *measurement of student teachers' abilities in preparing lessons including CL* was built on previous studies analysing lesson plans by means of a rubric (e.g. Ozogül et al., 2008). With regard to CL implementation in particular, a rubric for the analysis of lesson plans including a CL activity was developed (Chapter 5). The rubric consists of 17 criteria in three domains: (a) instruction, (b) organisation, and (c) evaluation (Freiberg, 2002). The rubric is based on the presence or absence of criteria and the clearness of the description of each component (Stronge & Tucker, 2003). Each criterion can be rated on a scale from 0 to 4 (0 = absent; 1 = unsatisfactory; 2 = needs improvement; 3 = adequate/meets expectations; 4 = exceeds expectations).

Strengths, limitations, and implications

In general, it can be stated that reliable and valid research instruments for measuring student teachers' knowledge and skills regarding CL implementation, as well as for analysing lesson plans including this instructional strategy were developed. These instruments can be applied in future research, after validation in varying contexts and countries. In addition, the developed measurement instruments can be valuable for practice as well, for example as input for student teachers' reflection.

The assessment task for measuring student teachers' knowledge about CL has taken into account the limitations of a previous instrument of Hornby (2009), which examined the pedagogical knowledge of student teachers from a sole focus on retrieving factual information. By designing a task based on different cognitive process dimensions, a more broad view on the knowledge base of student teachers is taken into account. Particular points of interest and limitations of the developed task need, however, to be taken into account.

First, the assessment task requires student teachers to write down their answers on open questions. As a consequence, their scores may be related to their motivation to elaborate, rather than to their actual knowledge. In this respect, making their performance on the task dependent on formal evaluation may influence their motivation to elaborate sufficiently in their answers. It may also be useful to further develop the task by adding different types of assessment questions (e.g. open questions, multiple choice, true or false, etcetera) for each dimension. This would also meet the actual limitation of the task that each dimension was operationalised by only one question in the task.

Secondly, student teachers' knowledge about CL was approached from a rather 'prescriptive' point of view. Although the criterion answer used for comparing student teachers' answers was based on theoretical and empirical grounds, it assumes that there exists a 'correct' answer on the assessment questions. However, Hedges (2012) emphasises that evidence-based professional knowledge is filtered through teachers' understandings and experiences in daily life or practice. As a consequence, we cannot assume a linear relationship between research on CL and practice. According to Verloop, Van Driel, and Meijer (2001) and Hedges (2012), teachers' personal and practical knowledge, shaped by first hand experiences such as teaching experiences or apprenticeship of observation, needs to be taken into account as well when investigating the knowledge base. Future research should explore whether and to what extent this practical knowledge corresponds to 'prescriptive' knowledge from theoretical and empirical sources. Loughran (2011) warns for the difficult character of studying teachers' professional knowledge of practice given its largely tacit character.

As to the ECLIS instrument, some strengths, limitations, and implications should be discussed as well. Although Krol-Pot et al. (2002) reported on an observational checklist for studying teacher behaviour during cooperative learning, the ECLIS instrument developed in the present dissertation comes towards the main limitations of that checklist. First, the previous observational checklist includes questions requiring answers in different formats (e.g., yes/no, Likert-scale from 1 to 5). By contrast, the ECLIS uses a fixed scoring approach. Second, some items in the observational checklist are included with the purpose of collecting information about

teacher and student behaviour ('Who is composing groups during cooperative learning?'), rather than evaluating skills. Finally, Krol-Pot's checklist included variables that hardly relate to each other, which hindered factor analysis approaches and more complicate quantitative research techniques. For the desired instructional teacher skills during CL implementation, the ECLIS includes different items in view of composing robust factors.

The ECLIS is suitable for the use by different stakeholders. In Chapter 3, we described the use of the ECLIS by student teachers and mentor teachers. It is however also possible to include even more observers for evaluation, such as teacher educators, experts, or peers to obtain a multi-perspective view as suggested by Nijveldt (2007). Further research is needed about the underlying process of lesson appraisal by different stakeholders on the topic of CL. General findings of Tillema (2009) and Ozogül et al. (2008) on the combination of different stakeholders in evaluation (e.g. the extent to which each observer is accustomed to CL; the standards each observer holds for evaluation) are worthwhile in that respect. Additionally, it may also be useful to provide a training for observers as it was introduced by Krol-Pot et al. (2008).

The ECLIS instrument in itself focuses on teacher behaviour during CL implementation. As it became clear in Chapters 3 and 6 of this dissertation, contextual variables may be influencing the way teachers succeed in performing and thus 'displaying' their skills in CL implementation. It is therefore recommended for future research to collect data regarding relevant contextual factors (e.g. class size, lesson duration, et cetera) in addition to the ECLIS instrument.

The rubric that we developed for analysing lesson plans including a CL activity, fills a notable gap in the research. Student and beginning teachers stressed in Chapter 6 the importance of an adequate lesson preparation in view of success in CL implementation. Given that the importance of instructional planning and anticipatory reflection (Schön, 1983) was also previously stressed in the literature (e.g. Halpern, 2002; Pinsky, 1997; Pinsky et al., 1998), there was an obvious need for an instrument that could identify strengths and weaknesses in lesson plans for CL implementation.

The developed rubric has shown its reliability merits due to the fact that the expectations for each score were clearly described. The content validity of the rubric was guaranteed by its foundation in the literature and the review by an expert panel. Other types of validity need to be further unravelled in future research. In view of this validity issue, lesson plans need to have a reasonable amount of details or elaboration in view of the analysis. In brief and very general lesson plans or 'planbook plans' (Jacobs et al., 2008), none of the rubric criteria can be observed.

Although the rubric can yield interesting findings regarding strengths and weaknesses in student teachers' lesson plans, we suggest future research to invest in combining different sources as suggested by Nijveldt (2007). The relationship between lesson plan quality and actual teacher performance is in this respect a valuable future research area.

Finally, the rubric instrument focuses on the analysis of the product of instructional planning (i.e. the written lesson plan). However, the process of instructional planning might be even more interesting for revealing more practical pedagogical knowledge. In this respect, we want to emphasise the opportunities of the rubric as a reflection instrument as well. Even though the rubric was developed for the purpose of analysing and evaluating student teachers' instructional planning competences regarding CL implementation, the instrument can also be suitable for discussions with peers, teacher educators, and mentor teachers to reveal their implicit pedagogical knowledge about the 'why' of some instructional decisions (Van Velzen & Volman, 2009).

RO 3	*Studying student teachers' competences and competency development regarding the use of CL, and the impact of an explicit training programme in this respect.*

As part of the second empirical study of this dissertation (intervention study), we investigated student teachers' knowledge and skills regarding the implementation of CL. In addition, we studied the impact of the training intervention including four 2-hour workshops and the use of CL during practicum (at least five times). As discussed before, we did not include attitudes in our studies, although they are a component of 'competence' (Korthagen, 2004). In Chapter 3 of this dissertation the results regarding knowledge development were described, whereas Chapter 4 focussed on skills development.

Main findings

Student teachers' knowledge about CL was measured twice (pre- (n = 210) and post- (n = 129) test) by the assessment task described as an outcome of the second research objective, whereas skills were scored by student (n = 105) and mentor teachers (n = 153) by means of the ECLIS in each practicum lesson where CL was implemented. Student and mentor teachers' skills appraisal did not differ significantly. As a consequence, further analyses were done on student teachers' data. Further research is, however, needed on the topic of assessment by different stakeholders, given that our results are in contrast with previous research from for

example Tillema (2009), who found significant differences on several aspects of the assessment process between student and mentor teachers. Attention is also needed to the extent to which mentor teachers are familiar themselves with the background and implementation of CL as a condition for evaluating and guiding student teachers, for they did not receive an explicit training in this respect.

The main findings regarding student teachers' knowledge and skills regarding CL implementation are not unambiguous. Student teachers' knowledge about CL appeared to be rather limited, whereas the data from the ECLIS point out that student teachers report to be relatively skilled in implementing CL. As to the knowledge aspect, in line with previous findings of Hornby (2009) student teachers remember only limited factual knowledge about CL. The scores for analysing, evaluating, and creating CL environments are also inferior. Conversely, student teachers scored well on questions regarding understanding and applying information about CL. The strong result for the dimension of 'applying' tallies with the positive findings regarding student teachers' skills during CL implementation in teaching practice, but it also leads to doubts about the suggested cumulative hierarchy in Bloom's taxonomy, assuming that student can only achieve a higher cognitive process dimension when they have mastered 'lower' dimensions (Krathwohl, 2002).

Both for student teachers' knowledge and skills, the impact of training was not convincing.

Although knowledge assessment scores were significantly higher as student teachers attended a higher number of training sessions, the general effect of training on knowledge about CL appeared to be rather limited. This is in contrast with Hornby's results (2009), who found a large effect size of 0.95 of workshop trainings.

For the six factors of the ECLIS, differences appeared over the five measurement moments, but no indication for a linear increasing pattern was found. The process of skills development was therefore further explored through multilevel repeated measures analyses. In general, the effect of training appeared to be rather limited, which is in contrast with previous training studies of Veenman et al. (2002), Ishler et al. (1998), and Krol-Pot et al. (2008). Several other variables were found to influence student teachers' skills regarding CL implementation. First, general teaching efficacy was found to be a significant predictor for student teachers' skills. This confirmed the results of Tschannen-Moran and Hoy (2001). Second, variables at classroom level such as grade and lesson subject were significantly related to student teachers' skills. When running the multilevel repeated measures analyses for each of the ECLIS-subscales separately, no significant improvement of student teachers' skills was found regarding social-affective guiding and the realisation of the key components of CL. Although the scores were relatively high, it appears that

improvement in this respect is a process that requires time. Further, it was notable that the variance between student teachers increased over the different measurement occasions for student teachers' (meta-)cognitive guiding behaviour during CL implementation and their approach of CL evaluation. This can be explained by the meta-character of stimulating metacognitive thinking and evaluation, which needs a higher complexity level of thinking (Flavell, 1987). The influence of context variables on student teachers' skills enactment remained unclear and need therefore further attention in future research.

Strengths, limitations, and implications

Given that previous research on CL implementation has predominantly overlooked the study of teacher competences, the main findings related to the third research objective contribute to the literature. Our studies offer an in-depth examination of student teachers' knowledge base and skills pertaining to CL implementation. Whereas the limited use of CL in teaching practice is often attributed to a lack of teacher competence (Baines et al., 2003), the present findings are only partly supportive of this interpretation. Although student teachers' knowledge base about CL is found to be limited, the implementation skills are generally adequate. We want to discuss five implications that ask for follow-up in future research.

First, the training intervention in the present dissertation needs to be discussed. Since Flemish teacher education appeared not to pay much attention to CL (see Chapter 2), four training workshops were organised for student teachers. The number of workshops is rather limited in comparison to previous studies (e.g. Ishler et al., 1998; Veenman et al., 2002). This may be an explanation for the findings that training is only restrictedly contributing to student teachers' competency development. Further, the training intervention was provided by the researcher in line with studies of for example Ishler et al. (1998), Veenman et al. (2002), Krol-Pot et al. (2008). However, Tigchelaar and her colleagues (2001) explain the limited CL implementation in teacher education by referring to a lack of related competences in teacher educators. In this respect, it might be useful for future intervention studies to focus predominantly on familiarising teacher educators as a first step, giving them the responsibility, the necessary background, and competences to familiarise their student teachers themselves. This may have a more long-lasting impact on the integration of CL in the curriculum of pre-service teacher education, In line with Fullan (2001), it is necessary to think beyond one-shot workshops and disconnected training. The preparation of student teachers for CL implementation needs to be part of the culture in teacher education, with a shared vision and adequate embedding of this instructional strategy in the curriculum (Darling-Hammond & Hammerness, 2005).

Second, an important limitation of our research on student teachers' competence is related to the decreasing number of participants over different phases of data collection. Drop-out was mainly due to student teachers' withdrawal from the teacher education program or from the practicum. With regard to the measurement of student teachers' skills during CL implementation in practicum, drop-out was mainly caused by mentor teachers' reluctant attitude towards CL implementation by student teachers. Therefore, we suggest that future studies collect data in a larger group of participants. Collecting data in the third year of the programme may be a suitable advise for overcoming the problem of withdrawal.

Third, the findings related to student teachers' skills were based on a self-evaluation scale, including the risk of bias as a result of a tendency to view oneself favourably (Rothermund et al., 2005) and consequently evaluating the own behaviour more positively. In Chapter 4, we tried to decrease this risk by including mentor teachers' appraisal. The fact that student and mentor teachers' appraisal did not differ significantly might be an indication of validity of the findings. However, as stated before, future research is still necessary to gain insight into the underlying processes and standards of assessment by different stakeholders given that previous studies indicated significant differences in this respect (Tillema, 2009).

Fourth, we predominantly approached each aspect of teacher competence separately, making it difficult to conclude in general terms about teacher competence regarding CL implementation. Therefore, future research should approach teacher competence from a more holistic point of view, for example by attuning the different measurement instruments and adding more observational data. Further, we experienced difficulties in several Chapters of this dissertation to assess the impact of training within a development perspective on teacher competence. We suggest in this respect to maintain in future research the perspective of competence 'development' as it was adopted in Chapter 4. The multilevel repeated measures design has shown its merits for analysing patterns in the skills' development taking into account changes over smaller periods of time.

No 'absolute' impact of training on skills could be found in our assessment. As a plausible explanation, we would like to refer to Tillema and Smith's (2009) distinction between assessment 'of' learning and assessment 'for' learning. In our research, we aimed to assess the processes *of* learning and development regarding CL implementation. However, during practicum teaching experiences mentor teachers provide feedback and student teachers reflect on their performance to improve future use of CL. These assessments *for* learning as forms of formative assessment may largely influence the rather summative assessments of learning. We therefore suggest that studies in the future take into account the impact of guiding, reflection and feedback. Further, it may be useful to combine the results of different sources (e.g. portfolio, video) to assess student teachers' competence as suggested

by Admiraal et al. (2011), Imhof and Picard (2009), Nijveldt (2007), and Stronge and Tucker (2003). The findings regarding the preparation of CL implementation as they are reported in Chapter 5 can already be such a source of evidence complementary to the results of the assessment task and the observation scale.

Finally, it is important to take up the relationship between pre-service competences and competency development on the one hand, and actual use of CL in teaching practice once entering the profession. Previous studies have focussed in their investigation on the impact of training in CL and teachers' intentions to use this instructional strategy (e.g. Veenman et al., 2002), but more evidence is needed about their actual behaviour. We took a first step to come towards this need by formulating research objective five in this dissertation.

RO 4 Examining how student teachers prepare for CL implementation.

To study student teachers' ability to prepare for CL implementation, 323 practicum lesson preparations including a CL activity, were analysed using a scoring rubric (see RO 2). Extensive elaborations on the design and the results of this study are reported in Chapter 5 of this dissertation.

Main findings

The analyses of these lesson plans including a CL activity provided insight into the strengths and weaknesses of lessons.

The most notable strengths of student teachers' lesson plans reflected more general instructional competences. Student teachers, for example, performed well in developing adequate learning tasks, which is perceived important for success in CL according to experienced teachers (Gillies & Boyle, 2010). In developing these tasks, student teachers succeeded in including positive interdependence and individual accountability of students as the most prominent key components of CL (Johnson & Johnson, 1999).

However, some important aspects of CL implementation appeared to be still inadequate after the training intervention. More specifically, there was far less evidence for the realisation of the three other key components of CL in the lesson plans. As a consequence, the promotion of direct interaction, attention for social skills, and evaluation of the group processes were perceived as notable weaknesses. First, the promotion of direct interaction was hindered by student teachers' difficulties to and lack of attention to prepare the organisational aspects of CL implementation (e.g. defining rules, classroom arrangement, group composition,

timing). This finding confirmed the general instructional planning decisions of senior teachers, who do not include these aspects typically in their lesson plans (Young et al., 1998). However, a study of Gillies and Boyle (2010) has emphasised that senior teachers perceive the organisational aspects most challenging during CL implementation, increasing the importance to consider this aspect sufficiently in advance. Second, there was a strong emphasis on the use of CL aiming at mastering content. Social objectives were only seldom formulated and striven for in the lesson plans. Third, the evaluation of group processes received only limited attention in student teachers' lesson plans. Student teachers tend to focus predominantly on the product of CL.

In addition to the strengths and weaknesses regarding the inclusion of CL key components in the lesson plans, it was remarkable that student teachers predominantly prepared for implementing CL in lessons regarding 'social studies and science'. The biased choice may be considered undesirable given the implicit, incorrect assumption that this instructional strategy can only be used in one particular subject.

Strengths, limitations, and implications

Although the absence of a pre-post-test design in Chapter 5 makes it impossible to obtain clear evidence about the impact of training on the quality of the lesson plans, the training has failed nevertheless to realise an overall adequate quality of lesson plans. In this respect, the findings of the lesson plan analyses reinforce the previous findings regarding student teachers' competency development regarding CL implementation (RO 3). To interpret the disappointing transfer of training experiences to teaching practice, the literature often refers to the manifest gap between theory and practice in education (Kessels & Korthagen, 2001; Loughran & Berry, 2005; Swennen, Korthagen, & Lunenberg, 2004). In this respect, we may assume that workshops on the theoretical and empirical background of CL are insufficient for student teachers to translate important CL principles to practice. Notwithstanding the training intervention may have failed to obtain the desired results, some other explanatory factors have to be taken into account. For example, chapter 6 provided insight into the strong impact of the school context on CL implementation in teaching practice. In addition, it is important to keep in mind that the quality of the lesson plans do not provide evidence about student teachers' actual performance during implementation. Future research should therefore explore the relationship between lesson plans and lesson realisation.

The findings of these lesson plan analyses have also important implications for teacher education practice. To anticipate difficulties regarding the gap between theory and practice, we suggest teacher education to pay more explicit attention to

the phase of instructional planning when it concerns CL implementation. Developing adequate lesson plans can be a first step to obtain a successful experience with CL by anticipating potential difficulties (Blümenfeld et al., 1996). The present findings can be used as a basis for developing or adjusting the curriculum on CL in pre-service teacher education. In this respect, it is abundantly clear that organisational aspects need far more attention, as well as process evaluation. Paying more attention to the phase of instructional planning in teacher education creates also opportunities to weaken the dominant influence of course textbooks on lesson preparations (Yildirim, 2003). Given that course textbooks in Flanders scarcely refer to CL, developing student teachers' competence in developing adequate lesson plans pertaining to CL becomes even more important. It may be also important to stimulate the development of lesson plans pertaining to the use of CL in a wide variation of teaching subject in order to break through the implicit relationship between CL and 'social studies and science'.

As stated before, the findings regarding student teachers' competence regarding CL implementation (RO 3) and the preparation of these implementation processes (RO 4) did not provide insights into the actual use of CL in teaching practice. Therefore, the fifth research objective tackled the in-depth exploration of student teachers' motives and experiences with regard to the implementation of CL.

RO 5	*Investigating how teachers experience the use of CL implementation during practicum periods in teacher education and during their first year in the teaching profession.*

The results regarding the fifth research objective are discussed in Chapter 6 of the dissertation. In a multiple case study, 15 student teachers were interviewed just before graduating regarding their motives to (not) implement CL on the one hand, and factors influencing success or failure in CL implementation on the other hand. Ten of them were interviewed in-depth once more after about one year in the teaching profession.

Main findings

Although Sharan (2010) holds the opinion that CL is often abandoned once the formal training programme ends, the within-case analyses only partly confirm his statement. Our main findings illustrate that the shift from teacher education to the teaching profession *can* be a challenging phase as to the implementation of CL, but the stories also illustrate that it does not necessarily have to be problematic. Three

general portraits are distinguished: frequent and successful use of CL, regular use of CL with variable success, and no or limited use of CL in spite of positive intentions at graduation.

The cross-case analysis provided insight into determinants influencing motives for using CL as well as into factors that influencing success and failure in CL implementation.

Student and beginning teachers' motives for using CL appeared to be largely determined by the school context, whereas Abrami and colleagues (2004) found that conceptions about CL explained almost half of senior teachers' motivation to use this instructional strategy. The school context needs to be perceived as an open, inspiring, and supportive environment for CL implementation. Inspiration and collegial support were found to be stimulating factors for CL implementation, confirming the findings of Lopata et al. (2003), Ishler et al. (1998), Krol et al., (2008), Abrami et al. 2004), and Veenman et al. (2000) for senior teachers. Although colleagues can provide the necessary inspiration and support, professional development was in our study perceived as an additional form of support. Student and beginning teachers further ask for more examples of CL in textbook series and in other school materials as a source of inspiration.

The school context is, however, often found to be hindering the implementation of CL. Beginning teachers often felt the pressure of institutional conformity (Dymoke & Harisson, 2006) to not implement CL when their colleagues were not using this instructional strategy. Conversely, student teachers often tended to avoid risk-taking during practicum since they were evaluated, in line with Klein's expectations (2001). This feeling of risk-taking is influenced by that fact that student teachers did not know the classes they taught very well, creating difficulties regarding an adequate group composition (Lou et al., 1996; Gillies & Boyle, 2010).

In addition to the school context, pupil characteristics are also frequently referred to as reasons to (not) implement CL. Young pupils and heterogeneous classes are perceived as less 'ready' for working and learning in group. Further, pupils' lack of familiarity with CL reinforces the time-consuming character of CL implementation and is therefore perceived as a restricting circumstance. The time-consuming character was also previously stressed by senior teachers as a large 'cost' of implementing CL (Abrami et al., 2004; Gillies, 2006).

Contrary to the strong influence of the school context on motives for CL implementation, the school level appears to be less frequently mentioned by student and beginning teachers as it comes to success in CL implementation . Determinants for success/failure are especially identified at the pupil (e.g. pupils' age and

competences), teacher (e.g. teaching competence), classroom (e.g. physical space), and lesson level (e.g. group composition).

Both for student and beginning teachers, success in CL implementation relates strongly to the level of particular lessons, as it was hypothesised based on Pinsky (1997) and Pinsky et al. (1998). In general, lesson preparations that anticipate instruction, organisation, and evaluation, are perceived of great interest since they cover most determinants at the lesson level. In this respect, research objective four of this dissertation has investigated student teachers' competences in instructional planning regarding CL implementation. It was found that student teachers had predominantly difficulties regarding the inclusion of organisational and evaluation-related issues of CL in their lesson plans. Future research should further investigate whether success or failure in CL implementation can be actually attributed to instructional planning issues, in line with the perception of student teachers.

Success was interpreted by the participants of Chapter 6 in relation to efficiency and effectiveness, whereas previous research focussed predominantly on the effect of CL on pupils' learning process (e.g. Marzano et al., 2001). During the first year of teaching in the profession, it is striking that several teachers readjust their expectations regarding 'success' in CL. For example, they learnt to differentiate in their expectations for every individual pupil as a result of their continuing experiences in educational practice.

Strengths, limitations, and implications

Previous research on CL implementation was predominantly based on quantitative measures of effectiveness and questionnaires on factors influencing the use of this instructional strategy. Recently, Gillies and Boyle (2010) added a qualitative research approach focusing on senior teachers' experiences with CL. We continued this qualitative approach on student and beginning teachers, yielding more rich, detailed and contextualised data than the prior quantitative studies. By following student teachers during two year, we also overcame the limitations of previous studies (e.g. Veenman et al., 2002; Ishler et al., 1998) that were only studying intentions to use CL or short-term effects of professionalisation regarding CL implementation.

However, we also need to address some limitations of our research that could be taken into account in the design of future studies. First, we used a retrospective approach in our case study, interviewing student and beginning teachers about the past year. It is, however, advisable for future research to reduce the time period that participants are questioned about, for example by including more interview occasions in the research design. Second, we suggest that future studies on success and failure in CL implementation would pay more attention to the subjective

character of 'effectiveness'. Since Oortwijn et al. (2008) stated that teachers might not accurately perceive the effectiveness of their own CL activities, it may be useful to include additional, more objective measurements of teacher performance (e.g. video registration, observations). The value of video recordings and portfolio as facilitating teacher assessment was recently indicated by Admiraal et al. (2001) and Imhof & Picard (2009).

In addition to the suggestions for future research, implications for educational practice and policy can be delineated. One might question the usefulness of paying explicit attention to CL in pre-service teacher education because some of the cases in our dissertation did not use CL in their teaching practice. However, we would like to stress, in line with Veenman et al. (2002) and Sharan (2010), the importance of giving student teachers the opportunity to experience CL, learn about it, practice it, and reflect on the value of it for teaching. Given the difficult character of CL implementation for student teachers, we suggest teacher education to further invest in longer practicum periods, offering the opportunity to use CL repeatedly. It might be useful to consider the first experiences with CL in a non-evaluated practicum period to overcome the threatening character. In general, we suggest not to invest exclusively in pre-service training regarding CL implementation, but rather to combine pre-service and in-service training for mentor teachers to stir a more stimulating environment. Mentor teachers would also gain competence in providing useful feedback regarding CL use through in-service training, which would meet the need for team support and guidance. The integration of reflection in peer groups or peer-coaching for student teachers in teacher education would also be useful as a form of support (Shachar & Shmuelevitz, 1997; Zwart et al., 2008). For beginning teachers, the development of a follow-up training might be interesting (Abrami et al., 2004).

4. General discussion

At the start of this doctoral dissertation, three important gaps in the literature on previous research regarding CL implementation were presented (see Chapter 1). First, there was a strong need for research on the topic of CL in the context of pre-service education (Grossman, 2005), given the predominant focus on in-service training and senior teachers. Second, little was known about the actual skills and knowledge of student and beginning teachers regarding CL implementation. Given the strong focus in CL research on the effectiveness of this instructional strategy for pupils on the one hand, and on the beliefs, self-efficacy, and intentions to use CL of teachers on the other hand, the study and development of competences was largely neglected or discussed only superficially (Bouas, 1996; Veenman et al., 2002).

Finally, previous research almost exclusively focussed on short-term effects of training intervention studies. They failed to study the impact of training on teachers' motives and experiences with CL implementation in the long run.

Based on these three gaps and points of interest, three empirical studies were set up. A first study explored the implementation of CL in Flemish pre-service teacher education colleges. In the second study, a training intervention on CL was introduced in order to familiarise student teachers with the background of this instructional strategy and the implementation in teaching practice. The focus was on the (development of) competences to meet the gap in the literature. Third, participants of the training intervention were studied during two additional years to examine their further experiences with CL on a longer-term basis.

In general, the exploratory study revealed that both student teachers and teacher educators in Flanders highly appreciated the use of CL for primary school children. However, student teachers valued CL less for their own learning processes. In addition, it appeared that CL was only limitedly integrated in Flemish pre-service teacher education. More than fifteen years ago, Bouas (1996) came to the same conclusion; consequently it can be argued that things have hardly changed in the meantime. These findings emphasise the need for student teachers' professionalisation regarding CL implementation, which was dealt with in the training intervention study. More particularly, the impact of the training on student teachers' knowledge and skills regarding CL implementation was investigated. Generally, the impact of the training, as designed in the present dissertation, was found to be rather limited. Student teachers' knowledge about CL was restricted, whereas their skills appeared to be quite adequate although some more difficult aspects of CL implementation were ascertained (e.g. organisational aspects, metacognitive guiding). Analyses of student teachers' lesson plans corroborated that student teachers' succeed at realising important conditions for and principles of CL to some extent, but the lesson plan analyses also confirmed apparent working points and weaknesses. The final empirical study provided us with insights about factors that influence the implementation of CL once entering the teaching profession. In line with studies on other 'innovative' practices in education (e.g. computer use; Tondeur, Valcke, & van Braak, 2008a), it was found that predominantly school contextual variables (e.g. guidance and support at school level) are influential. Experiences of success were mainly connected to well-considered, adequate lesson preparations, with a strong emphasis on organisational aspects. Although the focus of the present dissertation was on teachers' competence in CL implementation and previous studies linked the limited use of CL in teaching practice to limited teacher competence (Baines et al., 2003), beginning teachers in the follow-up study did not

relate their competences to their motives for CL implementation nor to experiences of success and failure while using this instructional strategy.

The present doctoral dissertation contributes to the body of knowledge by focusing on pre-service teacher education and by highlighting teacher competence with regard to CL implementation. The value of the research design and findings of this dissertation are further related to five issues: (1) the combination of a mixed-model and mixed-method design, (2) the multi-perspective data collection, (3) the development of adequate research instruments, (4) the authentic character of the research context, and (5) the long-term perspective of the research.

Mixed-model and mixed-method research design. The present dissertation combined a mixed-model and mixed-method design (Johnson & Onwuegbuzie, 2004), using quantitative and qualitative data sources (e.g. survey, interviews, lesson plans, observation scales) across the three stages of the research (exploratory study, intervention study, and follow-up study), and combining different methods to answer a single research question (e.g. gaining insight into student teachers' competence pertaining to CL implementation by analysing lesson plans as well as evaluating skills through observation and an assessment task). This variety in the research design was a valuable strength to address the research objectives in a comprehensive way, since it created the opportunity to obtain stronger evidence for a conclusion through convergence and corroboration of findings (Johnson & Onwuegbuzie, 2004).

Multi-perspective data collection. In previous studies on CL in teacher education, only student teachers' perspective was addressed (e.g. Veenman et al., 2002). The present dissertation came towards Nijveldt's (2007) strong plea for combining different perspectives. In Chapter 2, student teachers and teacher educators were surveyed regarding the integration of CL in pre-service teacher education, whereas in Chapter 4, student teachers and mentor teachers were scoring skills regarding CL implementation. In Chapter 5, student teachers' lesson plans were analysed as an 'alternative' source of evidence regarding CL implementation competence. The combination of these different stakeholders and data sources provided the opportunity to cross-check the data, to compare different perspectives, and to complement the views in order to get a more holistic picture about CL implementation in pre-service teacher education and student teachers' competence in that respect (Cohen, Manion, Morrison, & Morisson, 2007).

Development of adequate research instruments. Given the lack of focus on teacher competence in research on CL implementation, adequate instruments for measuring strengths and weaknesses in this respect were lacking to a large extent. First, an assessment task regarding CL knowledge was developed to overcome the limitations of Hornby's task (2009). Further, a scale was developed and validated to

evaluate student teachers' skills regarding CL implementation taking into account the main limitations of a previous observational checklist (Krol-Pot et al., 2002). Finally, a rubric was developed to analyse lesson plans including a CL activity. In general, the research instruments have shown their robustness and usefulness in the present doctoral thesis. Therefore, we have confidence in their value for future research, although further validation in other research contexts and educational systems is necessary. Applying these instruments for example to study expert teachers' knowledge and skills regarding CL implementation will provide additional validation and important points of comparison between novice and expert teachers. As stated before, the benefits of these instruments, in particular the skills' evaluation scale and the rubric, lie also in their potential as reflection and guidance instruments in the context of pre-service teacher education.

Authentic character of the research context. The research that was conducted in this dissertation was carried out in the authentic context of Flemish teacher education colleges for primary school teachers. As Siegel (2005) commented on the limited long-lasting impact of training interventions organised outside authentic contexts, the workshops in the present study were integrated in the regular teacher training programme. Further, student teachers were asked to practice the implementation of CL during their authentic practicum periods. This authentic character of the research context had beyond all doubt a positive impact on the validity of the data collection and subsequent findings.

Long-term perspective of the research. Teacher education literature often refers to the 'reality/transition shock' that beginning teachers are facing when entering the profession (Holloway, 2000; Korthagen, 2001; Korthagen et al., 2006). With regard to teacher intervention studies, it is therefore important to investigate the impact of training from a long-term perspective. As to studying CL implementation, the previous study of Veenman et al. (2002) solely focussed on student teachers' intentions to implement CL in teaching practice, without considering potential 'washing out' effects of training (Holloway, 2000; Korthagen, 2001) when entering the profession. In this respect, the long-term perspective of the present doctoral research design, focussing on studying participants during three successive years, was an important added-value. The impact of the training intervention on student teachers' competency development regarding CL implementation was studied during the second year of teacher education (see Chapter 3, 4 and 5). In addition, Chapter 6 reported on a follow-up study. At the end of the third year of teacher education, in-depth interviews were done with graduating student teachers. Almost one year later, these participants were interviewed after entering the profession. The findings provided not only insight into student teachers' intentions to use CL, but also revealed determinants affecting the actual use of CL and beginning teachers' experiences regarding CL implementation.

4.1 General limitations and directions for future research

By answering the research objectives, this dissertation contributes to the scientific study of CL implementation, and the professionalisation of student teachers in this respect. The present research was however not without limitations. Some limitations were already outlined in relation to the main findings discussed above. In this part of the general discussion, the main overarching limitations will be addressed and directions for future research with regard to study variables and the overall research design will be suggested.

Study variables

Central in the present dissertation were the concepts of 'CL' and 'teacher competence'. Although we elaborated in the first introduction chapter on the conceptualisation of both concepts in the context of the present dissertation, we illustrate some limitations of these conceptualisations which might be vital to take into account in future research.

First, in this dissertation the view of for example Dillenbourg (1999), Meloth and Deering (1999), and Palinscar (2002) was endorsed that CL covers all peer collaboration methods. We are, however, aware that until now, a universally adopted understanding of the concept 'CL' is still lacking (Resta & Laferrière, 2007). Given the confusion and different positions of authors regarding similarities and differences of CL in comparison to, for example, structured forms of 'cooperative learning' (MacInnerney & Roberts, 2004), difficulties may arise regarding the interpretation of the results. We therefore emphasise the importance of clarifying the central concept adequately in order to guarantee a shared meaning among participants as well as the final audience.

Second, the concept of 'teacher competence' was in the present dissertation approached from the perspective of Korthagen (2004), defining competence as the combination of knowledge, skills, and attitudes. By measuring these components of CL separately, we created however difficulties to conclude in general terms about 'competence'. In addition, it might be the case that teachers scoring well in our investigations of knowledge and skills regarding CL implementation will not use CL in their future teaching career. This was also clearly illustrated in Chapter 6, where we found that beginning teachers' motives for implementing CL were predominantly influenced by the school context. Their own teaching competences were not seen as strongly influencing their instructional decisions about CL implementation. Capacities are in this respect only preconditions, that need to be translated in actual behaviour in order to show this competence. Defined this way, competences represent a potential for effective teaching behaviour, and not the

behaviour itself (Korthagen, 2004). Therefore, further reflection on the concept of 'teacher competence' is needed.

Finally, it is important to consider teacher competence as dynamic rather than as a static characteristic. In Chapter 4 of this dissertation, this dynamic character of competence was taken into account by including several measurement occasions. Unfortunately, this was not feasible for the other studies. As a consequence, the other chapters mainly dealt with the study of 'products' as the outcome of training, rather than with dynamic processes. Future research should therefore invest more in qualitative, in-depth studies about factors that underlie pedagogical behaviour or decisions (e.g. motives for pedagogical decisions in lesson plans). The use of stimulated recall interviews for example can be useful to investigate process-related factors and implicit pedagogical knowledge. In addition, a long-term approach is necessary to study this development process of teacher competences regarding CL implementation, given the importance of conceptualising teacher professionalisation as a continuum within a lifelong learning perspective (Darling-Hammond & Hammerness, 2005). Pre-service teacher education is in this respect only a *'first step in a career-long process preparing only for entry into the profession. Induction and in-service teacher education have to be viewed as crucial components of the continuum of lifelong learning'* (Flores, 2011, p.462). In addition, Struyven and De Meyst (2010) question whether competences can be unlearned or diminish in effectiveness once learned. In the present study, we studied some of our participants during three successive years. An avenue for further research is to explore the competences and implementation throughout a longer part of the teaching career to gain further insight into the influence of induction, school characteristics, and further in-service professionalisation on CL implementation.

Another limitation regarding the study variables is that only some particular layers of the onion model of Korthagen (2004) were studied. The model actually includes six layers: commitment, identity, beliefs, competency, behaviour, and context. The focus of this dissertation was, however, mainly on knowledge, skills, beliefs/conceptions, self-efficacy, and the impact of training in this respect. Given that the first and second layers were not included in the research, these elements deserve attention in follow-up research. The 'behaviour' layer of the model was already partly addressed in the sixth chapter of our dissertation, by investigating the extent to which CL was actually implemented. However, the findings of this Chapter 6 also illustrated the large impact of contextual determinants on the implementation of CL. As a consequence, future research should include more contextual variables in the quantitative research design in order to explore the relationship between these contextual variables and the way teachers' perform in CL implementation.

Research design

The main limitations regarding the research design concern the study sample, the training that was used in the intervention study, the difficulties encountered to obtain a comprehensive view on teacher competence, the lack of information about influences of contextual variables, and the retrospective character within the long-term approach.

The study sample was mainly restricted to pre-service student teachers in Flemish teacher education colleges for primary schools. In Chapter 2, teacher educators were also participating in the exploratory survey study, whereas in Chapter 4 mentor teachers' perspective was used for data-source triangulation purposes.

Whereas the number of participants in the exploratory study was satisfactory, the study sample in the intervention study was rather small. As a consequence of conducting the research within the authentic context of teacher education in Flanders, the original sample suffered from a high drop-out rate. Many second-year student teachers left the teacher education programme during the academic year, or they suspended their practicum after recurring negative evaluations. Although the reasons behind drop-out in teacher education are without any doubt an interesting issue for future research, this was beyond the scope of the present dissertation. To overcome the limitations of a smaller study sample due to drop-out in future research, it is advisable to include more teacher education colleges to anticipate this problem. It can also be suggested to consider the integration of a training intervention in the third and final year of the teacher education programme, which traditionally suffers less from drop-out of students.

Second, the level of primary school student teachers was opted for given the large amount of research on the effectiveness of CL for primary school teachers (e.g. Johnson & Johnson, 1999). However, it may be fruitful to replicate this study in teacher education for secondary school in order to investigate the influence of the specialisation in a certain teaching subject on CL implementation.

Further, a set of three limitations is related to the training intervention that was reported on in Chapter 3 and Chapter 4.

First, only four training workshops were organised for student teachers on the background of CL and CL implementation. In comparison to previous studies, for example Veenman et al. (2002), who organised a course of eight 2-hour workshops, this was rather limited. However, more extensive training was not attainable within the authentic context of the daily routines and educational programme in the participating colleges. Future studies should focus on the differential impact of training intensity on student teachers' competency development.

Second, working in the authentic context of teacher education colleges implied that it was not possible to include a control group as to the investigation of the impact of training on student teachers' competence. Ethical guidelines in the teacher education colleges asked for a comparable training for each student with a view to an equal treatment during the courses. As a consequence, the inclusion of participants in both the experimental and control condition within each participating college was no option. Therefore, a control group of two colleges was initially planned against an experimental condition within three colleges. Unfortunately, one college dropped out of the study, creating difficulties to include a substantial control condition. In Chapter 3, this lack of a control condition was partly overcome by taking into account the number of training sessions student teachers actually attended. In addition to this issue, it was difficult to control for other influences from the actual teacher education programme (e.g. teacher educators that used CL in their lessons) on student teachers' competency development. In view of future research on the implementation of CL in pre-service teacher education, we would like to refer to the potential strengths of ethnographic research tools. Ethnography refers to an interpretative research methodology that intends to obtain a holistic picture of the everyday experiences of individuals by observing and interviewing them and relevant others' (Cresswell, 1994, p.163). By becoming a member of the community of study, authentic, context-specific, and reliable information can be gathered. This ethnographic approach would also reduce the limitations of self-reports (e.g. social desirability; Borg, 2006) as they were used in Chapter 2 of this dissertation.

Third, although the training was part of the regular teacher education programme, a researcher was providing the training instead of teacher educators. As a consequence, the intervention study partly failed to embed the training in the 'authentic context' of teacher education as suggested by Siegel (2005). In order to increase the chance of long-term implementation of the training in the programme, it might be important to invest in familiarising teacher educators to CL in order to prepare them to provide the training intervention themselves under guidance of researchers (Tigchelaar et al., 2001). Areas for future research should therefore focus on the competences and competency development of teacher educators regarding CL implementation.

Although the multi-perspective view on teacher competence and the use of data-source triangulation in our research could be perceived as a notable strength, we also met some difficulties and limitations of our approach.

For example, including the perspective of mentor teachers in the evaluation of student teachers' skills regarding CL implementation (Chapter 4) could promote the validity of our findings. However, we did not have sufficient evidence about mentor teachers' expertise, personal beliefs, practical knowledge, et cetera regarding CL

implementation. Some of these aspects can however influence mentor teachers' assessment (Dierick, Dochy, & Van de Watering, 2001). As a consequence, taking into account mentor teachers' perspective on student teachers' skills without collecting information on these participants bears the risk of decreasing the value and validity of our findings.

Further, although the use of different data sources (e.g. assessment task, observation scale, lesson plans) offered a rich view on student teachers' competence regarding CL implementation, it created difficulties to determine how the various data sources had to be combined as well. In this respect, we endorse the statement of Moss et al. (1998) that it is difficult making a comprehensive weighing of available evidence.

Since Chapter 6 of this dissertation revealed the strong influence of contextual variables on the implementation of CL, we regret the lack of taking into account contextual variables more explicitly in the quantitative studies of our dissertation. Future research should at least collect data on the pupils (e.g. familiarity with CL), classroom (e.g. available space), and school context (e.g. use of CL in the team) in order to investigate their impact on student teachers' performance during CL implementation.

A final limitation relates to the long-term perspective of the dissertation. As stated before, the follow-up study overcame the practice of studying only the short-term impact of training interventions in previous studies. However, some limitations were associated with the retrospective approach of the follow-up study. By asking student and beginning teachers to reflect and look back on their experiences and motives regarding CL implementation in the past year, a strong appeal was made to their memory. We therefore suggest future studies to include for example the use of stimulated recall interviews on a regular basis to overcome the retrospective character of the data.

4.2 Implications of the findings

Implications for theory and empirical research

Based on the main research findings, important implications for theory and empirical research could be delineated.

First, this dissertation contributes to the field of CL research, which has focussed on the role of the teacher during CL implementation since the last decade (e.g. Gillies, Ashman, & Terwel, 2008; Oortwijn, Boekaerts, Vedder, & Strijbos, 2008), but mainly failed to study teachers' competences. By developing adequate

research instruments regarding teacher competence in Chapter 3, 4, and 5, future research could proceed the exploration of teachers' expertise in relation to their actual implementation of this instructional strategy.

Second, the results in this dissertation partially confirmed previous findings regarding senior teachers' experience with and training in CL implementation. For example, student and senior teachers were both found to experience difficulties related to organisational aspects of CL implementation (e.g. Gillies & Boyle, 2010) and high-level guidance (e.g. Gillies, 2004). However, this dissertation also demonstrated the different situation of student and beginning teachers pertaining to CL implementation. Chapter 6 illustrated, for example, the pressure of 'institutional conformity' (Dymoke & Harisson, 2006) in this respect.

Third, it was found that pre-service teacher education still has a long way to go as to the actual implementation of CL. Explicit training interventions on this topic can be useful, although the findings also revealed that the impact on student teachers' competence was rather limited. As a consequence, the significance of 'congruent teaching' and 'teach as you preach' by teacher educators (Loughran, 2006; Murray & Male, 2005; Swennen et al., 2008) should gain importance in future empirical research on CL implementation in pre-service teacher education. The impact of teacher educators' modelling behaviour and additional explicating of their underlying pedagogical and organisational considerations and decisions may be more powerful.

Implications for practice and policy

The aforementioned findings and strengths of the research could be translated into the following suggestions for practice and policy.

Although several studies emphasised the importance of training teachers in the implementation of CL during pre-service teacher education (e.g. Cohen et al., 2004; Lopata et al., 2003; Veenman et al., 2002), the present main findings did not confirm this plea unambiguously. Chapter 1 revealed the limited implementation of CL in Flemish pre-service teacher education colleges, which could indeed serve as an argument to pay for more attention to this instructional strategy in teacher education programmes. The findings related to the intervention study, however, did not uncover a strong impact of the training as it was designed in our study on student teachers' competence regarding CL. This could evoke the impression that training student teachers for the implementation of this instructional strategy is not necessary or advisable. However, since student and beginning teachers themselves stressed the importance of professionalisation and training with regard to CL implementation as a precondition for further use of this instructional strategy (see Chapter 6), the

present dissertation supports the plea for more and continuous attention to CL in pre-service teacher education. As stated before, the process of familiarising student teachers with the implementation of CL cannot be narrowed down to a task for only one or two particular teacher educators within a college, or a one-shot training period of a few workshops. A shared vision and embedding of this process in the team of teacher educators is required in order to obtain a more sustained training regarding CL implementation (Fullan, 2001).

In this respect, the main question for teacher education becomes: "How does the training of student teachers have to take place?". The findings described in Chapter 6 underpin several suggestions for practice in this respect.

First, it is important to anticipate the problematic gap between theory and practice that student teachers are often suffering off (Korthagen et al., 2006), by combining theoretical lesson on CL with frequent opportunities to translate the theory about this instructional strategy into practice. In this respect, Chapter 6 revealed the importance of long, un-evaluated teaching to counter the 'threatening' character of first experiences with CL during evaluated teaching practicum. More guidance and formative assessment 'for' learning (Tillema, 2009) appears to be important to precede summative assessment 'of' learning. Self-reflection, peer discussion groups, and interim feedback from mentor teachers and teacher educators are worth considering.

Second, student and beginning teachers explicitly asked to 'be inspired' in relation to CL implementation. The inclusion of CL examples in textbook series or the provision of lesson plans that are examples of 'good practice' in relation to CL implementation can be fruitful for increasing the use of CL in teaching practice. However, as discussed previously in Chapter 4, teacher education should be aware of the risk of 'curriculum consumption' (Coulby, 2000). To counter this risk, teacher education programmes should invest more in empowerment and creativity of teachers through professionalisation in order to make teachers less dependent on the input from other stakeholders and materials (Aelterman et al., 2002; Darling-Hammond & Hammerness, 2005). The low student teachers' scores on the level of 'creating' CL environments in Chapter 2 confirmed this necessity. To provide good examples of CL to student teachers, teacher educators have to take their responsibility of modelling the use of CL in teacher education in order to prepare student teachers for integrating this strategy in their future classroom (Angelides, Stylianou, & Leigh, 2007; Loughran, 2006). Given that Loughran (2006) emphasises that pure modelling behaviour will be insufficient, we advise to take into account the principle of 'congruent teaching'. The concept of 'congruent teaching' stresses that teacher educators have to make their pedagogical behaviour explicit and legitimise their modelling actions by linking pedagogical choices to relevant theory (Swennen,

Lunenberg, & Korthagen, 2008). In order to enable teacher educators to engage in this modelling behaviour, in-service training on the topic of CL implementation should be provided for this professional group (Tigchelaar et al., 2001). This in-service training would also be fruitful for mentor teachers who also have a modelling function for student teachers.

Finally, training should focus more explicitly and more intensively on organisational aspects of CL, since student teachers' skills pertaining to CL implementation, as well as the analyses of the lesson plans revealed critical weaknesses and difficulties in this respect. Moreover, a recent study on senior teachers' difficulties with CL implementation confirmed the decisive impact of organisational aspects (Gillies & Boyle, 2010). Teacher education should familiarise student teachers for example with how they can obtain a well-considered classroom arrangement within a minimum of time, or reflect with them on adequate group compositions.

In addition to the implication regarding the preparation during teacher education, the findings of this doctoral research project have important implications for the intermediate phase between teacher education on the one hand and the teaching profession on the other hand. Chapter 6 revealed that the school context is largely determining the extent to which CL is actually being used. To counter the pressure of 'institutional conformity' (Dymoke & Harisson, 2006), professional autonomy needs to be supported (Hyslop-Margson & Sears, 2010). Further, the significance of support is even more important for beginning teachers than for student teachers during teacher education practice. Teachers have to strive for the implementation of CL as a team, they need to have the support of their colleagues to persevere when difficulties or challenges are confronted. The follow-up study showed that CL is used more frequently and with greater success when teams are supportive. Therefore, schools are challenged to design and endorse of a school policy on CL implementation given previous findings about the impact of shared vision, facilitating leadership, and micropolitics on educational change (e.g. Fullan, 2001; Hargreaves, Lieberman, Fullan, & Hopkins, 2010; Tondeur et al., 2008b; Tondeur et al., 2009). Further, it might be important to invest more in in-service training for senior teachers simultaneously with student teachers' pre-service preparation for CL implementation. In this respect, the development of partnership arrangements between teacher education colleges and schools may improve the way student teachers are prepared and educated (Edwards & Mutton, 2007; Margolin, 2007; Robinson & McMillan, 2006; Schepens, 2005).

Next to the importance of a school policy on CL implementation, our findings dovetailed with the often-heard plea for rethinking the working conditions for beginning teachers in general. The working pressure and short replacements put

pressure on the motivation of beginning teachers to invest in 'complex' strategies such as CL. Recent studies on mentoring programmes in teacher induction (e.g. Stanulis, Little, & Wibbens, 2011; Wang, Odell, & Schwille, 2008) are in this respect promising as a support for beginning teachers. Ministries of education should therefore consider these proposals to permit beginning teachers to grow into the profession.

5. Final conclusion

This study focussed on the investigation and improvement of student teachers' competence regarding CL implementation, given that the limited use of CL in teaching practice is often attributed to a lack of teacher competence while actual information about these competences is nearly absent. Further, studies on senior teachers' experiences with CL far outweigh the examination of pre-service teacher education practices regarding CL implementation.

Our empirical studies have focussed on the exploration of CL implementation in Flemish pre-service teacher education colleges, the study of (the development of) student teachers' competences regarding CL implementation and the impact of training in this respect, and the experiences with CL of both student teachers and beginning teachers. A mixed-model and mixed-method research design was used, including long-term, multi-perspective data collection within the authentic context of pre-service teacher education colleges for primary school teachers.

The main findings indicate that:

a. CL is only limitedly integrated in Flemish pre-service teacher education.
b. the research instruments developed for measuring student teachers' knowledge, skills, and instructional planning capacities regarding CL implementation are adequate.
c. no comprehensive conclusion about student teachers' competence with regard to CL implementation can yet be made since their knowledge about CL appears to be rather limited, whereas skills are reported as relatively adequate, and lesson plans including a CL activity indicate both strengths and crucial weaknesses.
d. slightly significant, but not convincing results were found for the impact of training – as designed in the present dissertation – on student teachers' competency development.
e. not teacher competence but school contextual variables are argued to determine student and beginning teachers' motives to implement CL.

f. experiences of success during CL implementation are perceived to be connected to well-considered, adequate lesson preparations, with a strong emphasis on organisational aspects.

Although this dissertation has limitations that require follow-up in future research, we hope that the conclusions and implications of our research can be a source of inspiration for other scholars, practitioners, and policymakers in order to promote the actual use of CL in teaching practice and to extend the research on CL implementation.

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Nederlandstalige samenvatting

Summary in Dutch

NEDERLANDSTALIGE SAMENVATTING

[SUMMARY IN DUTCH]

Samenwerkend leren in de lerarenopleiding: competenties en onderwijspraktijk van leraren lager onderwijs.

1. Probleemstelling

De voorbije decennia werd in het onderwijs de (sociaal-)constructivistische visie steeds nadrukkelijker aanwezig (Leach & Scott, 2002) vanuit onder meer de overtuiging dat het onmogelijk is om leerlingen in de huidige complexe, snel evoluerende maatschappij via een kennisoverdrachtsmodel voor te bereiden op de rest van hun leven (de Kock, Sleegers, & Voeten, 2005; Hargreaves, 2003). In de (sociaal-)constructivistische visie op leren en instructie staat de activiteit van de lerende centraal, alsook de mogelijkheden van gedeelde kennisconstructie met leeftijdsgenoten. De leraar domineert niet langer het leerproces van leerlingen (Hargreaves, 2003; Jonassen, Strobel, & Gottdenker, 2005).

Vele onderzoekers hebben de voorbije jaren binnen dit paradigma onderzoek gedaan naar de didactische meerwaarde en effectiviteit van samenwerkend leren. De Nederlandse term ‘samenwerkend leren’ verwijst daarbij naar het geheel van werkvormen waarbij leerlingen met elkaar samenwerken met het oog op het bevorderen van het eigen leerproces én dat van hun groepsleden (Ishler, Johnson, & Johnson, 1998). In dit proefschrift sluiten we met het begrip samenwerkend leren aan bij de Engelse term ‘collaborative learning’. In navolging van De Wever (2006), Meloth en Deering (1999), en Dillenbourg (1999) verwijzen we daarmee naar alle vormen van samenwerking tussen leeftijdsgenoten, waar gestructureerde vormen van ‘cooperative learning’ deel van uitmaken.

Resultaten van studies naar de effectiviteit van samenwerkend leren benadrukken de positieve invloed op cognitieve leerresultaten (bv. Johnson & Johnson, 1999; Slavin, 2004), het sociaal-emotioneel functioneren van leerlingen (bv. Johnson et al., 2001, Marzano et al., 2001; Tolmie et al., 2010) en de psychologische ontwikkeling van kinderen (bv. Johnson & Johnson, 1999; Marzano et al., 2001).

In recent internationaal onderzoek omtrent samenwerkend leren staat de rol van de leraar centraal om deze effecten te realiseren (Hertz-Lazarowitz, 2008). Het discours focust voornamelijk op het bevorderen van de kwaliteit van de interactie tussen leerlingen en de kwaliteit van het hulpgedrag tijdens samenwerkend leren

(Dolmans et al., 2003; Gillies & Boyle, 2008; Meloth & Deering, 1999; Prichard et al., 2006; Schmitz & Van Winskel, 2008; Webb, 2009).

Vanuit deze stijgende belangstelling voor de rol van de leraar binnen samenwerkend leren, neemt ook de aandacht voor de professionalisering van leraren toe (Cohen, Brody, Sapon-Shevin, 2004). Eerdere studies hebben op dit vlak sterk geïnvesteerd in de introductie van samenwerkend leren als een onderwijskundige innovatie in het traditionele handelingsrepertoire van ervaren leraren (bv. Ishler, Johnson, & Johnson, 1998; Krol et al., 2008). Meer recent groeit echter ook de aandacht voor de competentieontwikkeling van nieuwe generaties leraren in de implementatie van samenwerkend leren. Hiermee wordt aangesloten bij de redenering dat slechts nieuwe generaties leraren de cirkel van 'traditioneel' lesgeven kunnen doorbreken (Lunenberg & Korthagen, 2005). Studies ter zake hebben zich tot nu toe voornamelijk gericht op het in kaart brengen van de opvattingen en gebruiksintenties van learen (bv. Veenman et al., 2002). Er is evenwel ook nood aan verder onderzoek waarbij de competenties en de ontwikkeling van deze competenties bij studentleraren in het gebruik van samenwerkend leren wordt in kaart gebracht en opgevolgd, bij voorkeur in authentieke onderwijscontexten (Siegel, 2005). Het verkrijgen van inzicht in sterktes en zwaktes in de competenties ter zake van studentleraren, evenals hun beleving van het gebruik van deze werkvorm in de praktijk, kunnen namelijk helpen om het curriculum omtrent samenwerkend leren in de lerarenopleiding verder adequaat vorm te geven.

2. Onderzoeksdoelen

Aansluitend bij bovenstaande probleemstelling, beoogt dit proefschrift enerzijds inzicht te geven in de implementatie van samenwerkend leren in de lerarenopleiding in de Vlaamse context – meer specifiek de bacheloropleiding in onderwijs: lager onderwijs – en anderzijds de competenties van studentleraren in het implementeren van samenwerkend leren in hun klaspraktijk te bestuderen en verder te ontwikkelen. Vijf onderzoeksdoelen staan in dit proefschrift centraal.

1) In kaart brengen in welke mate samenwerkend leren aanwezig is in de praktijk van de Vlaamse lerarenopleidingen.
2) Het ontwikkelen van adequate meetinstrumenten om de competenties van studentleraren in het gebruik van samenwerkend leren te bepalen.
3) De competenties en competentieontwikkeling van studentleraren in het implementeren van samenwerkend leren, en de impact van een expliciet trainingsprogramma in dat verband, onderzoeken.
4) Het analyseren van de competenties van studentleraren in het voorbereiden van lessen waar samenwerkend leren deel van uitmaakt.

5) De ervaringen van (student)leraren bij het gebruik van samenwerkend leren tijdens hun stageperiodes en tijdens het eerste jaar in het lerarenberoep in kaart brengen.

3. Onderzoeksdesign

Om bovenstaande onderzoeksdoelen te bereiken, werden drie empirische studies opgezet. Daarbij is gebruik gemaakt van een mixed-model onderzoeksdesign (Johnson & Onwuegbuzie, 2004) met een mix van kwalitatieve en kwantitatieve onderzoeksbenaderingen binnen of over de verschillende fasen van het onderzoeksproces heen.

De bevindingen uit deze drie studies worden in dit proefschrift gestructureerd in 7 hoofdstukken. Het eerste (algemene inleiding) en het laatste hoofdstuk (algemene discussie en conclusie) zijn overkoepelende hoofdstukken. De overige hoofdstukken beschrijven het opzet en de resultaten van de empirische studies. Figuur 1 op pagina 25 van dit proefschrift illustreert de relatie tussen de verschillende onderzoeksdoelstellingen, de empirische studies, alsook de diverse hoofdstukken van dit proefschrift.

Een eerste, *exploratieve studie* sluit aan bij de eerste onderzoeksdoelstelling en beoogt inzicht te verwerven in de integratie van samenwerkend leren reeds in de Vlaamse lerarenopleidingen bij aanvang van dit proefschrift. Daartoe werd een surveystudie uitgevoerd bij studentleraren (n = 369) en lerarenopleiders (n = 120) uit 16 opleidingsinstituten. Er werd gebruik gemaakt van descriptieve analyses om zowel opvattingen van beide doelgroepen tegenover samenwerkend leren, gevoelens van self-efficacy in het gebruik van samenwerkend leren, als de mate waarin samenwerkend leren aanwezig is in de lerarenopleiding te exploreren. De resultaten van studentleraren en lerarenopleiders werden vergeleken door middel van *t*-testen. De invloed van algemene onderwijsopvattingen op de opvattingen tegenover samenwerkend leren is onderzocht via regressieanalyse. Multivariate covariantieanalyse maakte het mogelijk om de invloed van diverse variabelen (bv. opvattingen, self-efficacy) na te gaan op het gebruik van samenwerkend leren door lerarenopleiders. De resultaten van deze studie zijn verschenen in Educational Studies (Ruys, Van Keer, & Aelterman, 2010) en bieden aanknopingspunten om het trainingsprogramma, dat deel uitmaakt van de tweede empirische studie, adequaat – d.i. complementair aansluitend bij de bestaande praktijk – vorm te geven.

Een tweede onderzoeksfase omvat een *interventiestudie* die gericht is op het bereiken van onderzoeksdoel 3, 4 en 5. Het interventiegedeelte bestond uit een

trainingsprogramma waarbij 4 workshops van telkens 2 uur werden aangeboden aan tweedejaarsstudenten in de lerarenopleiding (bachelor in onderwijs: lager onderwijs). Daarin werd theoretische en empirisch ondersteunde achtergrondinformatie over samenwerkend leren verstrekt. Daarnaast werden studentleraren verwacht minimaal vijf keer een vorm van samenwerkend leren voor te bereiden en te gebruiken tijdens hun stages in de klaspraktijk. Over deze empirische studie wordt in dit proefschrift gerapporteerd in de hoofdstukken 3, 4, en 5.

Voorafgaand aan de interventiestudie werden, aansluitend bij de tweede onderzoeksdoelstelling, de nodige instrumenten ontwikkeld om competenties van studentleraren in het gebruik van samenwerkend leren in kaart te kunnen brengen. Meer specifiek gaat het om (a) een assessment taak voor het bepalen van het kennisniveau van studentleraren over samenwerkend leren; (b) een instrument om de vaardigheden van studentleren in het gebruik van samenwerkend leren in kaart te brengen; en (c) een rubric om de kwaliteit van lesvoorbereidingen met een vorm van samenwerkend leren te analyseren. De instrumenten en de ontwikkeling ervan worden respectievelijk toegelicht in de hoofdstukken 3, 4 en 5.

Voor het bereiken van de derde onderzoeksdoelstelling werd de competentieontwikkeling van studentleraren over een volledig academiejaar gevolgd. De focus lag daarbij op kennis en vaardigheden in het gebruik van samenwerkend leren. Aansluitend bij de vierde onderzoeksdoelstelling werden ook de competenties van studentleraren in het voorbereiden van lessen met een vorm van samenwerkend leren bestudeerd.

Pedagogische kennis. Enerzijds werd de kennis van studentleraren bij aanvang van het tweede jaar van de lerarenopleiding gemeten door middel van een assessment taak met open vragen (n = 210). Op het einde van het jaar, na het interventieprogramma, vulden 129 studentleraren van de oorspronkelijke steekproef de taak opnieuw in. De data zijn kwantitatief verwerkt na het scoren van de antwoorden volgens een ‘content quality comparison approach’ (Kraiger, Salas, & Cannon-Bowers, 1995). Door middel van *t*-testen werden pre- en post-test scores vergeleken. Deze studie wordt in detail beschreven in hoofdstuk 3 van dit proefschrift.

Vaardigheden. Bij 105 studentleraren en 153 mentoren werden data verzameld voor het bepalen van de ontwikkeling van vaardigheden in het gebruik van samenwerkend leren. Zij vulden op één tot vijf verschillende momenten doorheen stageperiodes informatie in over het vaardigheidsniveau bij de implementatie van samenwerkend leren. Door middel van *t*-testen werden de bevindingen van studentleraren en mentoren vergeleken. Multilevel repeated measures technieken maakten het mogelijk de ontwikkeling van de vaardigheden over verschillende tijdsmomenten te onderzoeken. Hoofdstuk 4 van dit proefschrift gaat meer specifiek

in op deze deelstudie, en is gebaseerd op een publicatie in Teaching and Teacher Education (Ruys, Van Keer, & Aelterman, 2011).

Lesvoorbereidingen. Aansluitend bij de vierde onderzoeksdoelstelling zijn de competenties van studentleraren in het voorbereiden van lessen met een vorm van samenwerkend leren in kaart gebracht. 323 authentieke lesvoorbereidingen van 100 studentleraren werden verzameld. Deze data zijn kwalitatief van aard, maar werden kwantitatief geanalyseerd aan de hand van een rubric. Na descriptieve analyses werden sterktes en zwaktes in de lesvoorbereidingen gerapporteerd in hoofdstuk 5 van dit proefschrift. Dit hoofdstuk is gebaseerd op een manuscript dat werd geaccepteerd voor publicatie in Journal of Curriculum Studies (Ruys, Van Keer, & Aelterman, 2012)

Als laatste fase in dit proefschrift werd een kwalitatieve *transferstudie* uitgevoerd, waarbij studentleraren die deelnamen aan de interventiestudie werden opgevolgd. Vijftien studentleraren werden op het einde van de lerarenopleiding, vlak voor het afstuderen, diepgaand geïnterviewd over hun ervaringen met samenwerkend leren. Na ongeveer een jaar in het lerarenberoep werden tien van hen opnieuw bevraagd. De gegevens van deze meervoudige case studie werden in eerste instantie aan een verticale analyse (within-case) onderworpen, waarna een horizontale analyse (cross-case) op basis van het principe van constante vergelijking van Strauss en Corbin (1998) volgde om weerkerende patronen in de data te kunnen vaststellen.

4. Overzicht van de voornaamste bevindingen

Hieronder geven we de voornaamste bevindingen uit dit proefschrift weer per onderzoeksdoelstelling (OD).

> *OD 1: In kaart brengen in welke mate samenwerkend leren aanwezig is in de praktijk van de Vlaamse lerarenopleidingen.*

Studentleraren en lerarenopleiders werden in de exploratieve studie bevraagd naar hun opvattingen en self-efficacy enerzijds, en naar de mate van implementatie van samenwerkend leren in de lerarenopleiding anderzijds.

De exploratieve studie toont aan dat ontwikkelingsgerichte opvattingen over goed onderwijs voor kinderen in het lager onderwijs sterker aanwezig zijn dan overdrachtsgerichte opvattingen bij zowel studentleraren als lerarenopleiders. Aangezien ontwikkelingsgerichte opvattingen sterker aansluiten bij de (sociaal-) constructivistische achtergrond van samenwerkend leren, kan een gunstig klimaat

voor samenwerkend leren worden verwacht. Dat blijkt ook uit de over het algemeen positieve opvattingen van studentleraren en lerarenopleiders over samenwerkend leren in het bijzonder. Beide groepen beschouwen deze werkvorm als waardevol voor kinderen in het lager onderwijs; voor de lerarenopleiders contrasteert dit met eerdere bevindingen van een kwalitatieve studie van Lunenberg & Korthagen (2005). Studentleraren werden ook bevraagd naar hun opvattingen over goed onderwijs voor zichzelf als studenten. Daarbij valt op dat zij zelf geen voorkeur hebben voor het ontwikkelingsgerichte onderwijs dat zij ideaal achten voor hun toekomstige schoolklassen. Samenwerkend leren wordt als significant minder zinvol voor het eigen leerproces aanzien dan andere leerstrategieën. Een mogelijke verklaring hiervoor kunnen eerdere, negatieve ervaringen met de werkvorm zijn (Lopata, Miller, & Miller, 2003).

Het gevoel van self-efficacy met betrekking tot de implementatie van samenwerkend leren is zowel bij studentleraren als lerarenopleiders gematigd positief. Opvallend daarbij is wel dat er geen significant verschil in gevoelens van self-efficacy zijn vast te stellen bij studentleraren uit de verschillende opleidingsjaren van de lerarenopleiding.

De implementatie van samenwerkend leren blijkt eerder beperkt in de Vlaamse opleidingsinstituten. Ondanks het modelgedrag dat van lerarenopleiders wordt verwacht (Loughran, 2006; Swennen et al., 2008), geeft meer dan de helft van de lerarenopleiders aan de werkvorm minder dan één keer per maand te gebruiken. Er gaat bovendien nauwelijks aandacht naar het voorbereiden van studentleraren op het gebruik van samenwerkend leren in de lagere school. Het volgen van nascholing of SL en positieve opvattingen over SL blijken een positieve invloed te hebben op het gebruik van deze werkvorm in de lerarenopleiding.

Het perspectief van studentleraren bevestigt in grote mate de antwoorden van de lerarenopleiders. Studentleraren geven aan dat traditionele onderwijsvormen overheersen in de lerarenopleiding, hoewel samenwerkend leren in hun perceptie toch relatief vaak aan bod komt.

OD 2: Het ontwikkelen van adequate meetinstrumenten om de competenties van studentleraren in het gebruik van samenwerkend leren te bepalen

Hoewel ‘competenties’ volgens Korthagen (2004) het geheel aan kennis, vaardigheden en attitudes betreffen, gaan we in dit proefschrift enkel in op de kennis en vaardigheden van studentleraren, meer specifiek ten aanzien van het gebruik van samenwerkend leren. De resultaten van onderzoeksdoelstelling 2 wordt in dit proefschrift verspreid gerapporteerd over de hoofdstukken 3, 4, en 5.

Voor het bepalen van het kennisniveau van studentleraren inzake samenwerkend leren is een assessment taak ontwikkeld. De vragen zijn gebaseerd op hedendaagse handboeken over de rol van de leraar in samenwerkend leren (bv. Gillies et al., 2007). Elke vraag in de assessment taak correspondeert met een specifieke procesdimensie van de herziene versie van Blooms cognitieve taxonomie (Anderson & Krathwohl, 2001). Deze procesdimensies zijn *herinneren, begrijpen, toepassen, analyseren, evalueren,* en *creëren*.

De antwoorden van studentleraren zijn gescoord volgens een 'closeness measure' (Kraiger, Salas, & Cannon-Bowers, 1995), waarbij een kwalitatieve vergelijking wordt gemaakt tussen de inhoud van het antwoord van de studentleraar en een criteriumantwoord. Na horizontale scoring is op die manier bij elke vraag van de taak een score op 5 toegekend.

De taak en het scoresysteem zijn met het oog op de face validiteit besproken met een expert panel van 7 ervaren leraren en 4 onderzoekers. De interbeoordelaarsbbetrouwbaarheid tussen twee onafhankelijke scoorders is goed voor de samples uit hoofdstuk 3 met Cohen's kappa hoger dan .80.

Voor het bepalen van vaardigheden van studentleraren in het gebruik van samenwerkend leren in de klaspraktijk, is het ECLIS (Evaluation of Collaborative Learning Implementation Scale) meetinstrument ontwikkeld. De ECLIS bestaat in een versie voor studentleraren (in de vorm van zelfevaluatie) en in een versie voor klasmentoren (in de vorm van een observatieformulier). Het instrument bestaat uit 41 items die aansluiten bij drie onderscheiden lesfasen: introductiefase, procesfase, en consolidatiefase. Op een schaal van 1 (zeer slecht of afwezig) tot 10 (excellent) wordt het gedrag, dat in de items wordt beschreven, gescoord naarmate het vertoond wordt.

Om de factorstructuur van elke lesfase uit de ECLIS te bepalen is vooreerst gebruik gemaakt van Principale Componenten Analyse (PCA) met oblique rotatie (δ = 0). Dit is in eerste instantie afzonderlijk gedaan voor elke groep participanten (studentleraren en klasmentoren) uit hoofdstuk 4. Aangezien de resultaten vergelijkbaar bleken, zijn de analyses in een later stadium gedaan op de gecombineerde datafile. De PCA resulteerde in zes verschillende factoren. Voor de introductiefase is één factor gevonden, namelijk *'kwaliteit van de introductie'* (12 items; Cronbach's α = .92). De procesfase omvat vier subschalen: *'organisatorische begeleiding'* (6 items; α = .86), *'sociaal-affectieve begeleiding'* (4 items; α = .86), *'(meta-)cognitieve begeleiding'* (4 items; α = .84), en *'realisatie van basisprincipes van samenwerkend leren'* (7 items; α = .91). De consolidatiefase wordt gemeten door één schaal, namelijk *'afronding en evaluatie'* (6 items; α = .89). De validiteit van de ECLIS is nagaan door confirmatorische factoranalyse (CFA) voor elke fase van de ECLIS afzonderlijk. De resultaten tonen een acceptabele model fit.

Voor het beantwoorden van de vierde onderzoekstelling was er ook nood aan een instrument dat de kwaliteit van lesvoorbereidingen met een vorm van samenwerkend leren kon in kaart brengen. Voortbouwend op eerdere studies die lesvoorbereidingen analyseerden aan de hand van een rubric (bv. Ozogül et al., 2008), is een scoringsrubric ontwikkeld specifiek voor de analyse van lesvoorbereidingen met samenwerkend leren.

De rubric bestaat uit 17 criteria in drie domeinen: (a) instructie, (b) organisatie, en (c) evaluatie. De mate waarin elk criterium duidelijk is uitgewerkt, levert een score van 0 tot 4 op (0 = afwezig, 1= onvoldoende, 2 = nood aan verbetering, 3 = adequaat, 4 = overtreft de verwachtingen). De rubric is als appendix aanwezig bij hoofdstuk 5 van dit proefschrift.

OD 3: De competenties en competentieontwikkeling van studentleraren in het implementeren van samenwerkend leren, en de impact van een expliciet trainingsprogramma in dat verband, onderzoeken.

Als deel van de interventiestudie, bekeken we de ontwikkeling van de kennis en vaardigheden van studentleraren in het implementeren van samenwerkend leren. In hoofdstuk 3 van dit proefschrift worden de resultaten van de kennisontwikkeling beschreven, terwijl in hoofdstuk 4 de nadruk ligt op de ontwikkeling van vaardigheden.

De kennis van studentleraren is gemeten aan de hand van de ontwikkelde assessment taak (cf. OD 2). Bij het begin van het tweede jaar van de bacheloropleiding in onderwijs: lager onderwijs blijkt de kennis van studentleraren over samenwerkend leren eerder beperkt. De scores voor *'herinneren'* van informatie over samenwerkend leren zijn zeer laag, hoewel dit volgens Blooms taxonomie de meest basale dimensie is. De bevinding strookt wel met eerdere resultaten van Hornby (2009). Studentleraren scoren daarentegen wel goed op het vlak van het *'begrijpen'* en *'toepassen'* van informatie over samenwerkend leren. Ook de scores voor het 'analyseren' van de rol van de leraar tijdens samenwerkend leren zijn eerder laag. Dit is voornamelijk te wijten aan een eenzijdige focus op organisatorische taken. De scores voor het *'evalueren'* en *'creëren'* van lessituaties waarbij samenwerkend leren wordt gebruikt zijn ondermaats in de pre-test. De bevindingen van deze studie plaatsen vraagtekens bij de gesuggereerde cumulatieve hiërarchie in de taxonomie, waarbij wordt verondersteld dat studenten een hogere dimensie enkel kunnen bereiken wanneer 'lagere' dimensies zijn beheerst (Krathwohl, 2002).

Gedurende het academiejaar werd de hierboven beschreven training – workshops en de praktijktoepassing van samenwerkend leren op stage – aangeboden aan studentleraren. Aan het einde van het academiejaar werd hun kennis over deze

werkvorm opnieuw in kaart gebracht. De scores blijken significant beter voor de dimensies *'toepassen'* en *'creëren'*. Het effect van de training is beperkt, maar wordt bevestigd door de significante verschillen in vooruitgang naarmate studentleraren meer dan wel minder workshops daadwerkelijk bijwoonden als onderdeel van de training.

Doorheen het tweede jaar van de lerarenopleiding implementeerden studentleraren samenwerkend leren in minimaal 5 lessen tijdens hun stages. Bij deze lessen vulden zij de ECLIS in om hun vaardigheden via zelfevaluatie te beoordelen. Ook hun mentoren scoorden de vaardigheden van de studentleraren tijdens deze stagelessen aan de hand van de ECLIS. De descriptieve gegevens wijzen erop dat studentleraren relatief vaardig zijn in de implementatie van samenwerkend leren. De scores zijn het laagst voor de consolidatiefase van de lessen. Uit paired samples *t*-tests blijkt dat de inschatting van studentleraren en mentoren niet significant verschilt, waardoor verdere analyses enkel op data van studentleraren zijn uitgevoerd.

Voor de afzonderlijke vaardigheden zijn verschillen over de meetmomenten waarneembaar, maar kan geen lineair stijgend patroon worden vastgesteld. Door middel van multilevel repeated measures analyse is de ontwikkeling van de vaardigheden nader onderzocht.

Deze analyse is eerst voor het gemiddelde van alle ECLIS-schalen uitgevoerd. 58,5% van de verschillen in vaardigheden kan worden gesitueerd op het studentniveau, terwijl 41,5% toe te schrijven is aan verschillen tussen lessen. Bovendien blijkt dat de vaardigheden in het implementeren van samenwerkend leren significant beter worden over de verschillende lesmomenten heen, hoewel de verschillen tussen studentleraren afnemen over de lesmomenten. In de volgende stappen zijn verklarende variabelen aan het model toegevoegd. Het algemene gevoel van self-efficacy in het lesgeven blijkt een significante voorspeller van de vaardigheden van studentleraren, wat eerdere studies bevestigt (bv. Tschannen-Moran & Hoy, 2001). Ook variabelen op het klasniveau beïnvloeden de vaardigheden van studentleraren significant. Het effect van de training blijkt eerder beperkt. Dit lijkt evenwel in contrast met eerdere bevindingen van Veenman et al. (2002), Ishler et al. (1998) en Krol-Pot et al. (2008).

In een tweede fase van het onderzoek is de multilevel repeated measures analyse uitgevoerd voor elk van de ECLIS-subschalen afzonderlijk. Daaruit komen volgende conclusies naar voor: (a) vaardigheden in het gebruik van samenwerkend leren worden over het algemeen significant beter tussen het eerst en het vijfde meetmoment; dit is echter niet het geval voor de subschalen *'sociaal-affectieve begeleiding'* en *'realisatie van de basisprincipes van samenwerkend leren'*; (b) het gevoel van self-efficacy als leraar is significant positief gerelateerd aan de vaardigheden met betrekking tot de *'introductie'* van samenwerkend leren, de

‘*(meta-)cognitieve begeleiding’*, en de ‘*evaluatie’* van samenwerkend leren. Naarmate de kennis van studentleraren over samenwerkend leren beter is, beoordelen ze hun organisatorische begeleiding minder positief; mogelijk hanteren zijn hogere competentiestandaarden voor zichzelf (Townsend & Wilton, 2003); (c) er werden geen duidelijke resultaten vastgesteld met betrekking tot de invloed van contextfactoren; en (d) de variatie tussen studentleraren neemt toe voor de subschalen *‘(meta-)cognitieve begeleiding’* en *‘evaluatie’* van samenwerkend leren over de diverse meetmomenten heen. Een mogelijke verklaring ligt in het meta-karakter van deze aspecten, die een hogere complexiteit van denken vragen (Flavell, 1987).

OD 4: Het analyseren van de competenties van studentleraren in het voorbereiden van lessen voor waar samenwerkend leren deel van uitmaakt.

Om de competenties van studentleraren in het voorbereiden van lessen met samenwerkend leren te bepalen, werden 323 lesvoorbereidingen geanalyseerd met de ontwikkelde scoringsrubric (cf. OD 2). Uitgebreide toelichtingen bij het opzet en de resultaten van deze studie zijn opgenomen in het vijfde hoofdstuk van dit proefschrift.

De meest opvallende sterktes in de lesvoorbereidingen hangen gedeeltelijk samen met algemene leraarcompetenties. Studentleraren slagen er immers zeer goed in (a) een adequate leertaak te ontwikkelen die aansluit bij de lesdoelstellingen en het ontwikkelingsniveau van hun leerlingen; (b) het kiezen of ontwikkelen van geschikte materialen en bronnen; en (c) de (in)formele evaluatie van het product van samenwerkend leren. Naast deze algemene vaardigheden, vallen ook een aantal sterktes op die specifiek gerelateerd zijn aan het gebruik van samenwerkend leren. Het gaat meer specifiek om de realisatie van positieve interafhankelijkheid en individuele aanspreekbaarheid als basisprincipes van samenwerkend leren. Het frequente gebruik van rollen en materiaalafhankelijkheid is hierbij opvallend.

Voor een aantal aspecten zijn de verschillen tussen de lesvoorbereidingen erg groot. Daardoor kunnen ze moeilijk eenduidig als een sterkte dan wel zwakte worden beschouwd. Het gaat daarbij in eerste instantie over hoe studentleraren (a) er met het ontwerp van hun activiteit voor willen zorgen dat leerlingen effectief en efficiënt met elkaar zullen samenwerken; (b) samenwerkend leren zullen introduceren bij hun leerlingen; (c) samenwerkingsvaardigheden (verder) zullen ontwikkelen bij hun leerlingen. Daarnaast zijn er ook met betrekking tot de organisatorische component van het gebruik van samenwerkend leren aspecten die soms adequaat zijn uitgewerkt, maar in een groot aantal andere lesvoorbereidingen om cruciale aanpassingen vragen. Het gaat daarbij om de (her)inrichting van het klaslokaal, de groepssamenstelling, en de timing van de les. Dergelijke

organisatorische aspecten worden ook door ervaren leraren beschouwd als een uitdaging in de implementatie van samenwerkend leren (Gillies & Boyle, 2010).

Als opvallende zwaktes komen vier zaken naar voren. Ten eerste staan studentleraren in hun lesvoorbereiding nauwelijks stil bij hun eigen handelen als leraar tijdens samenwerkend leren. Daarnaast worden slechts in beperkte mate sociale doelstellingen bij de lessen geformuleerd en nagestreefd. Daarmee samenhangend krijgt ook de evaluatie van het groepsproces opvallend weinig aandacht. Ten derde bevatten de voorbereidingen voor het gebruik van samenwerkend leren in eerder beperkte mate expliciete afspraken en regels. Tot slot blijkt ook differentiatie zo goed als afwezig in lesvoorbereidingen waarin samenwerkend leren is geïntegreerd, hoewel er tal van mogelijkheden zijn bij deze werkvorm om te anticiperen op verschillen tussen leerlingen en groepen.

> *OD 5: De ervaringen van (student)leraren bij het gebruik van samenwerkend leren tijdens hun stageperiodes en tijdens het eerste jaar in het lerarenberoep in kaart brengen.*

In het zesde hoofdstuk van dit proefschrift wordt de vijfde onderzoeksdoelstelling van een antwoord voorzien. Een multiple case studie met interviews van studentleraren (n = 15) vlak voor het afstuderen en met 10 van hen als beginnende leraar na ongeveer een jaar in het lerarenberoep, biedt inzicht in de ervaringen met samenwerkend leren. De verhalen worden bekeken vanuit twee verschillende invalshoeken: de motieven om al dan niet met samenwerkend leren aan de slag te gaan enerzijds, en de ervaringen met succes en falen in het gebruik van samenwerkend leren anderzijds.

Vooreerst is elk verhaal van de participanten afzonderlijk geanalyseerd (within case analyse). Daarin valt op dat de verhalen van een aantal participanten opmerkelijk vergelijkbaar verlopen. Drie verschillende patronen kunnen worden onderscheiden: a) frequent en succesvol gebruik van samenwerkend leren, b) regelmatig gebruik van samenwerkend leren, maar afwisselend succes, en c) geen of beperkt gebruik van samenwerkend leren, ondanks intenties bij het afstuderen.

Bij de horizontale analyse (cross case) is specifiek gefocust op welke determinanten de motieven en succeservaringen beïnvloeden.

De motieven voor het gebruik van samenwerkend leren blijken sterk verschillend voor studentleraren en beginnende leraren in vergelijking met eerdere studies bij ervaren leraren (Abrami et al., 2004). De motieven worden in sterke mate beïnvloed door de gepercipieerde kansen en beperkende omstandigheden. Voornamelijk de

studentleraren ervaren frequent een gebrek aan autonomie met betrekking tot hun pedagogische aanpak. Ook bij beginnende leraren blijft dat gevoel nog doorwerken. Structurele factoren blijken eveneens het gebruik van samenwerkend leren af te remmen. Vooral de tijdsdruk, maar ook de beperkte beschikbare klasruimte en grote klasgroepen hebben een negatieve impact op de implementatie van samenwerkingsvormen. Specifiek voor de beginnende leraar komen daarbij nog de specifieke omstandigheden van beperkte aanstellingen in het onderwijs.

Inspiratie en collegiale ondersteuning hebben vooral een stimulerende invloed, wat overeenkomt met eerdere bevindingen (bv. Lopata et al., 2003). Studentleraren en beginnende leraren zijn vragende partij voor voorbeelden van samenwerkend leren in handleidingen en bestaand schoolmateriaal. Ook professionele ontwikkeling waarderen zij sterk. De verhalen van enkele beginnende leraren maken duidelijk dat collegiale ondersteuning en een enthousiasmerende schoolleider (de motivatie voor) het gebruik van samenwerkend leren positief beïnvloeden.

Bepaalde leerlingenkenmerken worden in de ervaringen van de participanten genoemd als reden om samenwerkend leren minder te gebruiken. Meest invloedrijk is de voorafgaande ervaring van de leerlingen met de werkvorm. Naarmate kinderen minder ervaren zijn, vraagt het extra tijd van de startende leraren om hen met samenwerkend leren vertrouwd te maken, waardoor de leraren vlugger afhaken om deze werkvorm te gebruiken. Daarnaast worden jongere leerlingen en heterogene klassen met veel zorgleerlingen gepercipieerd als minder ‘klaar’ voor het werken in groep.

De ervaringen met samenwerkend leren tijdens stage en het eerste jaar in het lerarenberoep bevatten tevens tal van verwijzingen naar factoren die het succes en falen van het gebruik de werkvorm beïnvloeden. Succes wordt daarbij beschouwd in relatie tot zowel efficiëntie als effectiviteit. Zowel verklarende factoren op het niveau van de leerlingen, leraar, klascontext, als het lesniveau komen voor. Het schoolniveau kwam niet aan bod in de verhalen van studentleraren en beginnende leraren.

De meest invloedrijke factoren voor het bekomen van succes in samenwerkend leren worden door studentleraren en beginnende leraren toegeschreven aan het niveau van een specifieke les. Vooral de lesvoorbereiding blijkt daarbij van groot belang, aangezien die anticipeert op zowel de instructie, organisatie als evaluatie. Het voorbereiden van een adequate groepssamenstelling wordt gepercipieerd als erg cruciaal. Studentleraren en beginnende leraren delen daarbij de visie van meer ervaren leraren (Gillies & Boyle, 2010).

Op het leerlingniveau blijkt de vertrouwdheid met samenwerkend leren, de leeftijd van de kinderen en bijhorende competenties, en de attitude van leerlingen het succes van samenwerkend leren te beïnvloeden.

Op het klasniveau worden vooral de grootte van het klaslokaal, de grootte van de klasgroepen en het klasklimaat vermeld als voorwaarden voor het succes van samenwerkend leren.

Op het niveau van de leraar blijkt het voornamelijk van belang dat de leraar zijn leerlingen kent. Enkel dan heeft hij voldoende achtergrondkennis om groepjes leerlingen samen te stellen die efficiënt en succesvol met elkaar kunnen samenwerken. Tijdens het eerste jaar in het beroepsveld valt het ook op dat de meeste leraren hun verwachtingen ten aanzien van het 'succes' van samenwerkend leren bijstellen.

5. Conclusie

De internationale literatuur wijst op een beperkt gebruik van samenwerkend leren in de klaspraktijk, ondanks veel positieve onderzoeksresultaten over de effectiviteit van deze werkvorm. Als verklaring voor de beperkte implementatie wordt veelal verwezen naar een gebrek aan competenties bij leerkrachten, hoewel feitelijke informatie hierover ontbreekt. Bovendien wordt sterk gefocust op onderzoek omtrent het instructiegedrag bij ervaren leraren, ten nadele van studentleraren in de lerarenopleiding. In dit proefschrift stond daarom de studie en bevordering centraal van competenties van studentleraren met betrekking tot de implementatie van samenwerkend leren.

Onze empirische studies hebben de implementatie van samenwerkend leren in de Vlaamse lerarenopleidingen in kaart gebracht, de (ontwikkeling van) competenties van studentleraren met betrekking tot samenwerkend leren bestudeerd alsook de impact van een trainingsinterventie, en de ervaringen van studentleraren en beginnende leraren met samenwerkend leren bevraagd. Hiervoor werd een combinatie van een mixed-model en mixed-method onderzoeksdesign gebruikt. Data werden verzameld in de authentieke context van de bacheloropleiding voor leerkrachten lager onderwijs, vanuit het perspectief van verschillende stakeholders en over een periode van meerdere jaren.

De belangrijkste bevindingen wijzen erop dat:

a. samenwerkend leren slechts beperkt geïmplementeerd wordt in de Vlaamse lerarenopleidingen.
b. de instrumenten die werden ontwikkeld voor het meten van kennis, vaardigheden en capaciteiten voor het maken van lesvoorbereidingen bij studentleraren, adequaat zijn.

c. een eenduidige conclusie omtrent de competentie van studentleraren m.b.t. de implementatie van samenwerkend leren moeilijk te formuleren. De kennis van studentleraren over samenwerkend leren bleek immers beperkt, terwijl hun vaardigheden als relatief goed werden ingeschat. Lesvoorbereidingen voor het gebruik van samenwerkend leren in de klaspraktijk blijken zowel sterktes als cruciale zwaktes te bevatten.
d. de trainingsinterventie uit dit proefschrift een significant positieve impact op de competentieontwikkeling van studentleraren blijkt te hebben, die evenwel niet overtuigend groot is.
e. niet zozeer de competenties van leerkrachten maar voornamelijk de schoolcontext bepaalt of studentleraren en beginnende leraren al dan niet met samenwerkend leren aan de slag gaan in hun klaspraktijk.
f. succeservaringen tijdens samenwerkend leren voornamelijk worden toegeschreven aan doordachte, adequate lesvoorbereidingen, met een sterke nadruk op de organisatorische aspecten van het gebruik van samenwerkend leren daarbinnen.

Dit proefschrift heeft onvermijdelijk beperkingen die aandachtspunten vormen voor vervolgonderzoek. Toch zijn we van mening dat de conclusies en implicaties van dit onderzoek een inspiratiebron kunnen zijn voor andere onderzoekers, professionals in het praktijkveld, en beleidsverantwoordelijken met het oog op het bevorderen van het feitelijke gebruik van samenwerkend leren in de klaspraktijk en het onderzoek hieromtrent.

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Academic output

ACADEMIC OUTPUT

Output related to this dissertation

Journals (a1)

Ruys, I., Van Keer, H., & Aelterman, A. (2010). Collaborative learning in pre-service teacher education: an exploratory study on related conceptions, self-efficacy and implementation. *Educational Studies, 36,* (5), 537-554.

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Conference contributions

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Other academic output

Journals (a1)

Ruys, I., Defruyt, S., Rots, I., & Aelterman, A. (in press). Differentiated instruction in teacher education: A case study of congruent teaching. Manuscript accepted for publication in *Teachers and Teaching: Theory and Practice*.

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